THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XX. No. 499—23RD YEAR.] LONDON, NOVEMBER 21, 1871. [Subscription per Annum. { 15s. in Advance. 18s. Credit.] Price 8d. Unstamped.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.
GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 80, Bankside; and Honduras Wharf, Cubit Town. Large stocks kept.
Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.

GEORGE GLOVER & CO.,
Patentees of the Standard Gasometers for the Government, and of the
IMPROVED DRY GAS-METERS.

These Meters are warranted to measure correctly and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured.

To meet the increasing demand, G. GLOVER AND Co. have just entered on possession of extensive premises adjoining their present Works in Ranelagh Road, and they are now prepared to execute promptly, orders to any extent. They keep in stock all sizes of Meters up to 200 lights. In cases of haste, on the receipt of a telegram early on one day, their Meters can be delivered next day in any part of England, and in the large towns in Scotland.

Particulars and lists of prices forwarded on application to—
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236, GEORGE STREET, GLASGOW;
OR
15, MARKET STREET, MANCHESTER.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they have also been awarded in the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for Fire-Clay Retorts of all shapes and dimensions, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Coal Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.

JOHN RUSSELL AND CO.,
THE OLD TUBE-WORKS, WEDNESBURY;
AND
THE ALMA WORKS, WALSALL.
Established at the commencement of Gas Lighting.
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69, UPPER THAMES STREET;
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5, CHARLES STREET, SOHO; and
16, SOHO SQUARE, } LONDON
35, 36, 37, & 39, GRANBY ROW, MANCHESTER.
J. R. and Co. are the original manufacturers of Wrought-Iron Gas Tubes and Fittings, and Inventors of the LAP-WELDED TUBES for Locomotive and Marine Boilers.
J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.
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WET AND DRY GAS-METER
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All materials found for the alteration of Public Lamps for lighting with the Rod. Regulators with Lava Burners.

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NEAR NEWCASTLE-ON-TYNE.
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J. & W. ROMANS, Consulting Gas Engineers and Coal Factors, of Edinburgh and London, CONTRACT for supplying any quantity of COAL and CANNEL.
They are also Contractors for leasing Gas-Works, for supplying, erecting, or repairing gas apparatus and fire-clay goods.
Messrs. ROMANS, being lessees of several Gas-Works, have their Cannels tested in the ordinary working process, thus securing for their customers a guarantee beyond mere laboratory experiments.
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Coal, machinery, fire goods, &c., shipped to all parts of the world.

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CROLL'S DRY GAS-METER,

PRIZE MEDALS.
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NEW YORK, 1853
PARIS, 1855.

(INVENTED & PATENTED IN 1844,)
COMBINING ALL THE LATEST IMPROVEMENTS,
MANUFACTURED ONLY BY

PRIZE MEDALS.
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THE GAS-METER COMPANY, LIMITED,
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MEDAL AWARDED, EXHIBITION, 1862, "FOR GOOD WORK."
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Twyere Coils for Blast Furnaces, Boring Tubes, Core Bars, Gun-Metal and other Cocks, Boiler Mountings, &c.
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STEAM-COCKS, AND ALL KINDS OF GAS-JOINTS.

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FOR GAS, STEAM, AND WATER;

Also ORDINARY WELDED WROUGHT-IRON TUBES and FITTINGS,

FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

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For Gas, Steam, Water, &c.

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LAP-WELDED IRON & HOMOGENEOUS METAL TUBES

For Locomotive, Marine, and Stationary Boilers.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools of all kinds.

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WORTLEY FIRE-BRICK AND RETORT WORKS,

Near

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W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of

RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY,

beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.

The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

Estimates for Setting, or Bricklayers sent when required.

GAS OVENS IN SEGMENTS OF EQUAL QUALITY.

A large Stock of Fire-Bricks, Fire-Clay, Terra Cotta, and Drain-Pipes of all Sizes kept in London at Mr. ALFRED WILLIAMS, Wharf, 64, Bankside, Southwark, where all particulars of Prices, &c., may be obtained.

N.B.—*Export orders continue to have prompt attention.*

TRADE MARK.

THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

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WAREHOUSE: SOUTHWARK STREET, LONDON.

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ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.;

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THOMAS PIGGOTT & CO.,

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MANUFACTURERS OF

TELESCOPIC & SINGLE GASHOLDERS,

CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

CAST AND WROUGHT IRON GIRDERS, BRIDGES, AND ROOFS,

STEAM-ENGINE BOILERS, & GENERAL WROUGHT-IRON WORK.

London Agents: PORTER and LANE, 172, FENCHURCH STREET, E.C.

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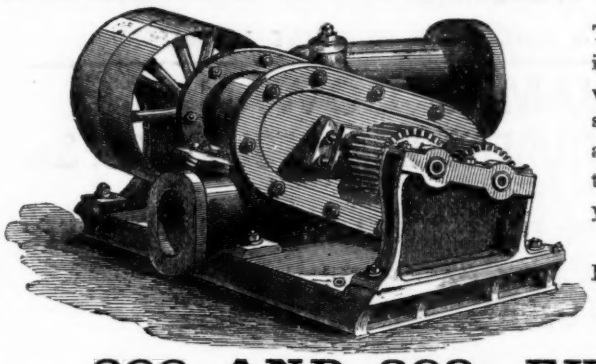
SOLE MAKERS OF

FORBES'S PATENT ROTARY PUMP,



The very best Pump yet introduced for pumping in gas-works, tanneries, distilleries, breweries, water and sewage works, paper-mills sugar-houses, starch and chemical works, for draining quarries and irrigating land, filling tanks at railway stations, factories, towns, mansions, ships, and dock-yards.

In use at several of the largest gas-works in London.

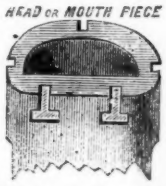
For testimonials and particulars, apply at

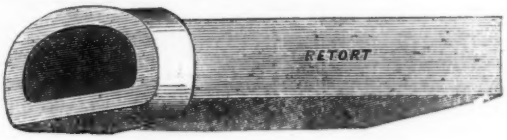
366 AND 368, EUSTON ROAD, N.W.

Diameter of Pipes, Suction and Delivery.	Gallons raised per Hour.
Inches.	
2	2,000
2½	3,000
3	4,500
4	7,500
5	12,500
6	18,000
7	24,000
8	31,000
9	40,000
10	48,000
11	59,000
12	71,000
14	96,000
15	110,000
16	125,000
18	160,000

KING BROTHERS,

STOURBRIDGE FIRE-BRICK AND RETORT WORKS.



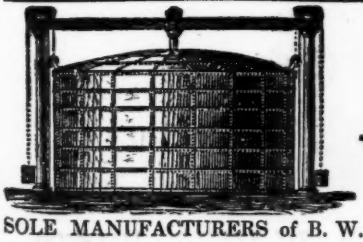


KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning, thus rendering them FREE FROM CRACKS AND CORRECT IN FORM. By great care in Manufacturing, combined with the advantages in burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize.

Retort Ovens, Fire-Bricks, Guards, Saddles, Rabbitted Bars, Flues, and Quarries, are all Manufactured of the same quality of Clay.

Every Retort and Brick is branded "King Brothers, Stourbridge."

Agent in Ireland—Mr. JAMES FURNESS, DOCTOR GARDENER STREET, DUBLIN.



IMPROVED GAS APPARATUS,

FOR CITIES, TOWNS, VILLAGES, &c.,

INVENTED AND MANUFACTURED BY

W. C. HOLMES & CO.,

WHITESTONE IRON-WORKS, HUDDERSFIELD.

SOLE MANUFACTURERS of B. W. THURSTON'S IMPROVED SCRUBBER, CONDENSER, and WASHER, in use in many of the principal Gas-Works on the Continent.

PATENTEES of the IMPROVED COMBINED PURIFYING APPARATUS, so eminently adapted for Exportation.

ESTIMATES, PLANS, and SPECIFICATIONS PREPARED for BUILDINGS and APPARATUS.

Prospectus, Price Lists, &c., on application.

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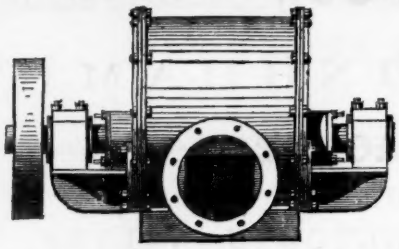
*** *Please address letters to Huddersfield.*

REFERENCES TO NEARLY 300 GAS-WORKS.

BEALE'S GAS-EXHAUSTER IMPROVED.



FROM 250 TO 250,000 CUBIC FEET PER HOUR.

Since Mr. BEALE'S retirement, the Oldest Makers are

J. BURTON, SONS, AND WALLER,

MAKERS OF ENGINES, MACHINERY, and IRONWORK for GAS-WORKS.
Efficient and durable TAR, LIQUOR, and SYPHON PUMPS.
GAS-VALVES in stock, 2 inches to 30 inches.
SELF-ACTING BYE-PASS VALVES, with Lid and Relieving Lever,
ROTATORY, TUMBLER, and CAPILLARY WATER DISTRIBUTORS for SCRUBBERS.
EXHAUSTERS from 3000 to 30,000 per hour in stock.

HOLLAND STREET, BLACKFRIARS, LONDON, S.E.,
Between Blackfriars' and Southwark Bridges.

LAMBERT BROTHERS, WALSALL.

ALPHA TUBE & FITTING WORKS

E. J. & J. PEARSON,

DELPH & TINTAM ABBEY FIRE-CLAY & BRICK WORKS,

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PROPRIETORS OF
BEST GLASS-HOUSE POT & CRUCIBLE CLAY:
MANUFACTURERS OF
GLASS-HOUSE POTS, CRUCIBLES, GAS-RETORTS, & FIRE-BRICKS OF EVERY DESCRIPTION.

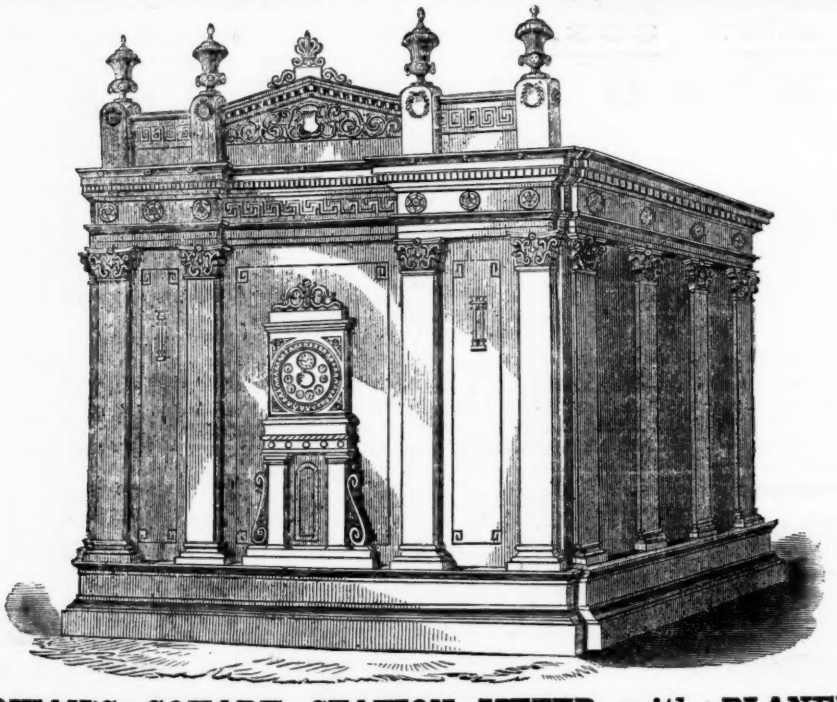
WILLIAM & BENJAMIN COWAN,

WET & DRY GAS-METER MANUFACTURERS, BRASSFOUNDERS, &c.

ESTABLISHED 1827.

Sole Manufacturers of ESSON'S PATENT COMPENSATING GAS-METER,
AND OF
COWAN'S PATENT SIDE-VALVE GAS-METER,

BUCCLEUCH STREET WORKS, EDINBURGH.



W. & B. COWAN'S SQUARE STATION-METER with PLANED JOINTS.

GOVERNORS, PRESSURE REGISTERS, TEST GASHOLDERS, GAUGES, &c.

W. & B. COWAN'S DRY GAS-METERS, in CAST-IRON CASES,

Possess a simplicity of construction and facility for repair greater than any yet produced, while the excellence of the material and workmanship, and accuracy of registration, cannot be surpassed. The superiority of their Dry Meters in Tin Cases is also well known, having stood the test of years.

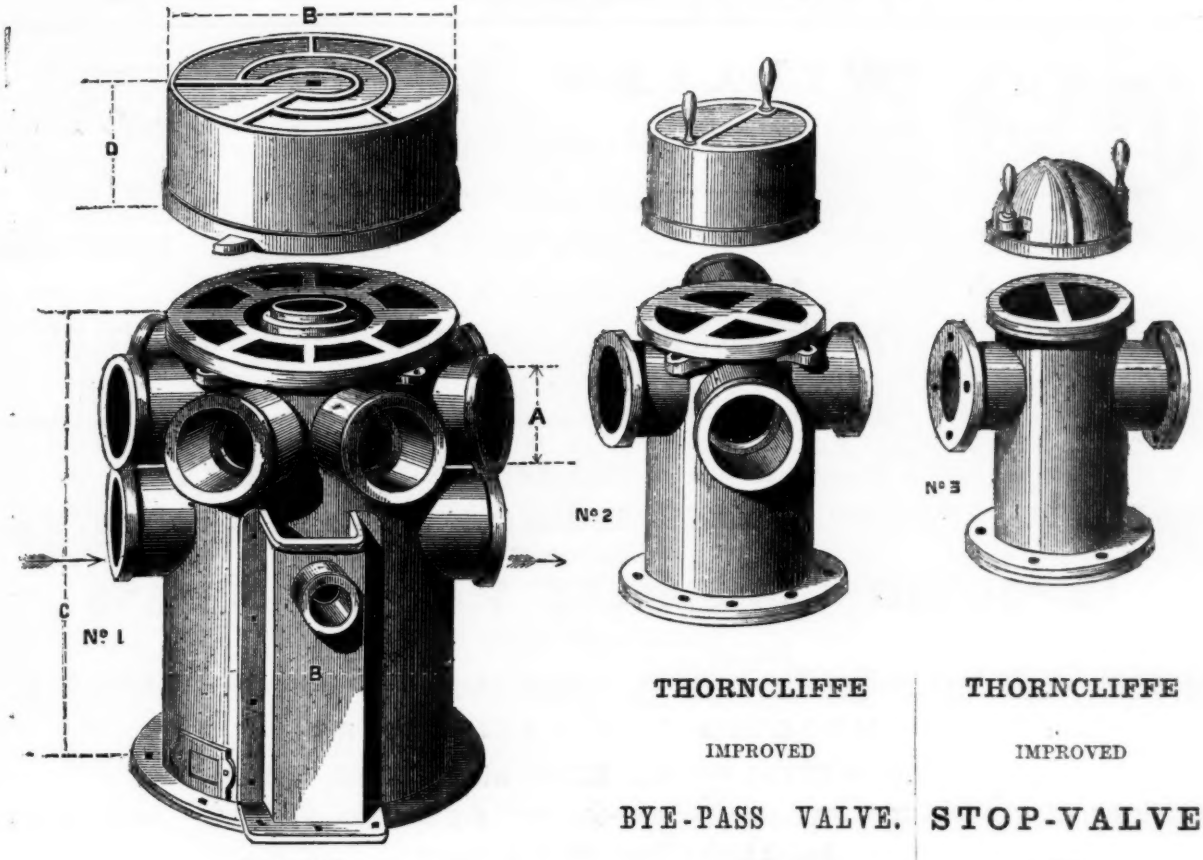
PRICE LISTS ON APPLICATION.

THE THORNCLIFFE IMPROVED CENTRE-VALVE,

MANUFACTURED BY

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.



Sizes of the

THORNCLIFFE IMPROVED CENTRE-VALVE.

		Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A	Bore of Pipe...	4	5	6	7	8	9	10	12
B	Diam. of Body.	16	20	23	26	28	31	34	40
C	Height of Tank.	33	35	38	43	46	48	51	56
D	Depth of Cover.	8	9	10	11	12	13	14	16
	Total height...	41	44	48	54	58	61	65	72

THORNCLIFFE IMPROVED BYE-PASS VALVE.

SIZES

From 3 ins. upwards.

THORNCLIFFE IMPROVED STOP-VALVE.

SIZES

From 3 ins. upwards.

In all cases the Covers are cast heavy enough to resist any required pressure.

The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

These Valves may be made of any size to suit any position of boxes, to stand any amount of pressure, warranted and tested with gas before leaving the manufactory, prepared to work any number of boxes in rotation—say, two, three, four, five, six, or eight—and for all Valves above 12-inch ports a suitable rack-and-pinion movement is attached if preferred. These Valves (specially arranged) are applicable to inlet or outlet pipes of gasholder, to act as Bye-pass Valves to meters, governors, exhauster, condensers, scrubbers, washers, driers, and duplicate systems of hydraulic main; also to act as Stop-Valves on special mains about the works. Where it is important no impediment be offered to tar or ammoniacal liquor, the same having uninterrupted flow to the general tar-well on the works, and for which purpose the slowly changed, often disordered, and at all times obstructive Slide-Valve (challenging the best of them) is superseded by the exceedingly simple, instantaneously changed Dome-Top Valve, which also carries so marked an index, whether open or shut, at any distance from close observation, providing the Valve can be seen at all. See sketch in perspective, No. 3.

London Office—34, LONDON WALL, MOORGATE STREET, E.C.

JOHN HALL & CO.,

STOURBRIDGE,

MANUFACTURERS of FIRE-BRICKS, LUMPS, & TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

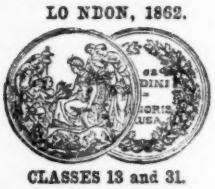
PARIS, 1867.

CLASSES 24 and 53.

WILLIAM SUGG,

GAS ENGINEER.

LONDON, 1862.



CLASSES 13 and 31.

PUBLIC LAMP GOVERNORS, LEVER COCKS, AND POLE LIGHTERS,

LAMP METERS AND BOXES.

LOWE'S JET PHOTOMETERS CAN NOW BE RATED TO 14 CANDLES.

VINCENT WORKS, VINCENT STREET, WESTMINSTER, S.W.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

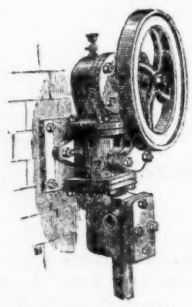
AND

IMPROVED DRY GAS-METERS;

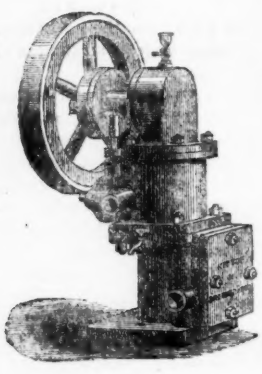
STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS,

And all kinds of Experimental Gas Apparatus.



Attached to Wall-Plate.



KITTOE & BROTHERHOOD'S

PATENT

"PARAGON" STEAM-PUMP.

Sizes Nos. 1 to 10 deliver from 75 to 21,000 gallons per hour; the height in feet being equal to twice the steam pressure in lbs. per square inch. Prices from £10 to £90.

GAS COMPANY'S OFFICE, LUTON, BEDFORDSHIRE,
Feb. 23, 1870.

Gentlemen,—The Paragon Pump which I purchased of you in 1868 has been in constant use from the date of its purchase to this time, for the supplementary supply of two 8 h.p. steam-boilers. It is in request day and night, and has performed the duties required of it without needing any repairs.

Yours respectfully,

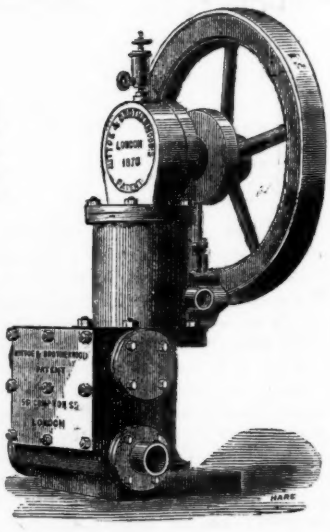
Messrs. Kittoe and Brotherhood. W. PHILLIPS.

MANAGER'S OFFICE, REDHILL GAS-WORKS,
Sept. 3, 1871.

Gentlemen,—The No. 6 Paragon Pump supplied by you has satisfactorily performed the work for which it was ordered—viz., feeding the boiler and pumping up water for the use of the works. In my opinion, it is a very compact arrangement, the working parts are thoroughly enclosed and protected, and the valves are very simply and quickly got at. It is a useful and reliable auxiliary.

Yours truly,

Messrs. Kittoe and Brotherhood. H. T. EVERIST, *Manager.*



FOR FULL PARTICULARS, APPLY TO

MESSRS. BROTHERHOOD & HARDINGHAM,

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FIG. 1.

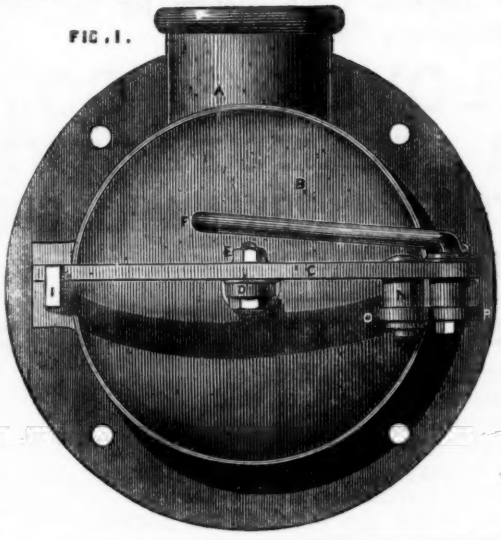
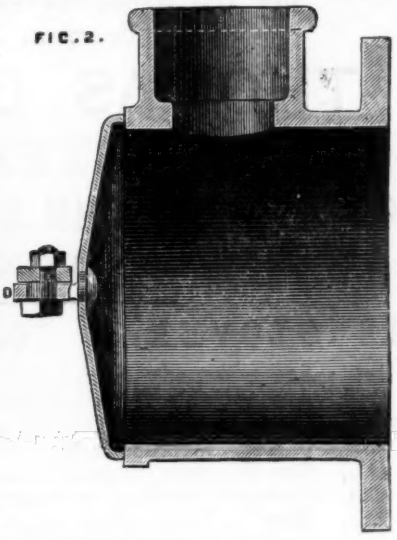


FIG. 2.



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Corporation Gas-Works, Stockton.
Chartered Gas Company, Westminster.
Cork Gas-Works.
Dewsbury and Batley Gas Company.
Dublin Consumers Gaslight and Coke Company.
Dunstable Gas-Works.
Imperial Gas-Works, St. Pancras.
Ipswich Gas-Works.
Kingston-upon-Hull Gaslight Company
London Gaslight Company, Nine Elms
Lewes Gas-Works.
Louth Gas Company.
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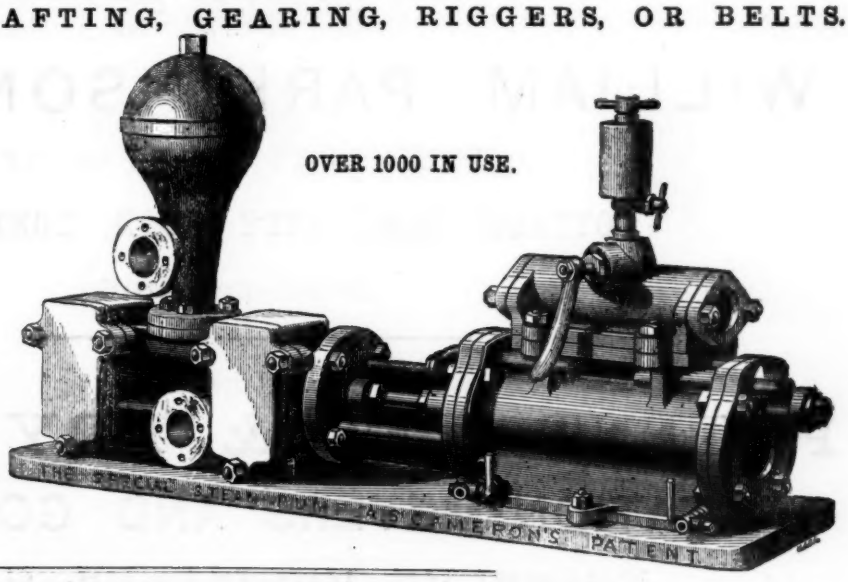
Northampton Gas Company.
Phœnix Gas-Works, London.
Richmond Gas Company.
Rio de Janeiro Gas Company.
Reading Gas-Works.
Shipley Gas-Works, near Bradford.
St. Albans Gas-Works.
Sutton, Southcote, and Drypool Gas Company, Hull.
St. Helen's Gas Company, Lancashire.
Windsor Royal Gaslight Company.
Wandsworth and Putney Gas Company.
Woolwich Equitable Gas Company.
Western Gas-Works, Kensal Green.



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IMPORTANT TESTIMONIALS.

Manager's Office, Local Board Gas-Works, Middlesborough, March 19, 1868.

Dear Sirs,—In reply to your inquiry, I beg to say that the "Special" Steam-Pump, which you supplied to these works some months ago, has been at work ever since for pumping tar and ammonia water. I like it well, and am more than satisfied, for I am really pleased with its mode of doing double duty.

I am, very respectfully yours.

JOHN DUNNING, Manager.

Messrs. Tangye Brothers and Holman.

Richmond Gas Company, Manager's Office, Gas-Works, Richmond, June 17, 1868.

Dear Sirs,—I have the pleasure in stating that the three "Special" Steam-Pumps which we have in use—viz., one for water, one for pumping liquor through the scrubbers, and the other for filling tar barges, &c., are working well in every respect, and, I think, cannot be too highly recommended.

Yours truly,

JAMES ELDRIDGE, Manager.

Messrs. Tangye Brothers and Holman.

Sutton, Southcote, and Drypool Gas Company, Hull, May 1, 1871.

Gentlemen,—In reply to your note No. 410, April 29, I am very glad to inform you, that in a few hours after I got the pump started, and after I had written you, it did its work beautifully, and has continued to do so, throwing one day 4000 to 5000 gallons per hour, although you say 3250 gallons is its capacity. It is a splendid pump, the best I ever saw, and has just emptied a tank 82 feet diameter by 16 feet deep in 100 hours. I should have written to you some days ago had your note come earlier.—Yours truly,

F. W. OLDFIELD, Manager.

London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.

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4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

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PRESSURE REGISTERS, GAUGES,

EXPERIMENTAL METERS, PHOTOMETERS, GASHOLDERS, &c., &c.

WATER METERS.

W. P. & Co. beg to state that they are now prepared to supply Station-Meters with planed joints.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, NOVEMBER 21, 1871.

Notes upon Passing Events.

Mr. Bruce, a Home Secretary almost as unfortunate as Mr. Walpole, has authoritatively announced that he will not in the approaching session introduce any Bill for the better government of the Metropolis. We have not the slightest doubt that, on reading this important announcement, there was not an alderman, or a common councilman, or an officer, from the under-sheriff to the sword-bearer, of whom it might not have been written,

The boldest held his breath for a time!

The Corporation of London, and all the vested interests of the many parochialities that constitute the local government of the Metropolis, have got their reprieve—"the long day" for which every criminal prays. In deferring any interference with the municipal or parochial chaos, the Government are wise in their generation. Unless you are very strong and active and clever, it is as well to follow the French proverb, and "let sleeping cats "lie." The theoretical necessity for reform in the local government of the police district of London is overwhelming. But as it cannot be attempted without injuriously handling vested interests in all sorts of powers, patronage, privileges, perquisites, salaries, and dignities, it is impossible to frame a rational scheme of metropolitan municipal government without awakening the energetic opposition of all those who have anything to lose by reform; while, on the other side, very little support is to be expected from the party who have nothing personal to gain by the change. The state of affairs is quite different to that which existed when the first English Municipal Reform Act was passed. That was a triumph of the *outs* over the *ins*. The parties who had been excluded for centuries from holding municipal offices in our chartered cities and boroughs, belonged, for the most part, to the political party which had just carried the Parliamentary Reform Act, of which the Municipal Act was a complement. All that has gone by. Whoever wishes to touch the Corporation of London will find himself, if a Liberal, opposed by Liberals like the Aldermen Lawrences, for instance, who are Conservative to the backbone in all that concerns Guildhall, although prepared to apply a political probe and scalpel to the Established Church, and the House of Lords, and every other Conservative institution in the country. Were a Conservative Ministry to attempt the task, goaded by the desire to add something important to the statute-book, and by the natural wish to teach the Radicals of the City of London that what was "sauce for the goose was sauce for the gander," we suspect they would receive but scant support from the average Liberal party; yet it is quite certain that all the working members of the Common Council are oppressed by the cumbrous nature of the machinery they have to keep in motion. There are many details they would like to amend, and some absurdities they would like to abolish; but they are like the directors of railway companies who hesitate to go to Parliament lest their tariff of passenger fares and goods rates should be overhauled and the maximum reduced. The farce of the judges at the Central Criminal Court having to wait until that fifth wheel of the judicial coach—an alderman—could be caught, is even more absurd than the dead-lock to which the Common Council deliberations have lately been brought by the absence of the same important dignitary. It is exceedingly inconvenient that one body and one set of officers should control the streets of the City, and another, quite distinct, the bridges, which form so important a part of the streets. That the Corporation should have the privilege of appointing and the penalty of paying a number of judicial officers for the benefit of all the metropolitan counties, is an anomaly that could not exist a day after a measure of rational reform. Supposing such arrangements defensible, they could only be maintained by extending the machinery of the Corporation to the whole metropolis. To this the friends of the Corporation would probably not object, if they were not also compelled to afford the whole metropolis the benefit of corporate funds. Although the citizens of London have lost all their trade privileges and monopolies, they have other privileges of which Corporation dinners are not the least. This is amusingly exhibited in a letter addressed to the *City Press* by an ex-master of the Barbers Company—one of the few companies the members of which are recruited from the craft it was originally intended to regulate. Peers and great merchants do not disdain to be Fishmongers, and even Spectacle-makers; but we never heard of a Barber with a handle to his name, unless he happened to be knighted when sheriff. The Barber complained that his Livery, one of the oldest companies, received few or no invitations to the feasts so liberally bestowed by the Lord Mayor on the members of the Twelve Great Companies, and he threatened that if the Barbers did not get their share of turtle, venison, and the other delicacies of the season, they would appear in force in the Guildhall at the elections of Lord Mayors and sheriffs, disturb the harmony of settled arrangements, and show that they could use their votes if they were not permitted to use their tongues in a more agreeable manner. What made this communication more comic was that the writer—a most respectable man, no doubt—did not see that he was offering his vote for a dinner; whereas, if any candidate for Parliament had proposed to treat him to a gallon of beer, he would have been insulted, and

the M.P. would have lost his election. Many citizens of London would be astonished, if not shocked, to hear that the City is the only place in England where candidates for office openly promise to reward their supporters with places of charity, privileges of education, and dinners. The Metropolitan Board has shown how much work can be done by a small number of representatives and a very moderate staff of officers. London could not spare its Lord Mayor; it might even extend his reign, like that of the Lord Provost of Edinburgh, to three years, with advantage. London can afford, if needful, sheriffs for the whole metropolis. Aldermen elected for seven years, and eligible for re-election, and common councilmen for three, would certainly have more vigour than the present aged representatives of wards which are nearly as much out of date as the extinct boroughs of Sarum and Gatton. A Common Council of fifty members would still be disproportionately large in comparison with a House of Commons which in a session of six months does all the public and private business of three kingdoms. Such a Common Council for the metropolis might still retain ample funds for splendid hospitality to distinguished Englishmen and foreigners; but the expense of dining the electors would be saved, because they would, on the new suffrage, be too numerous to be fed. But it is a reform that will lose nothing by keeping, and will come as surely as those unexpected Irish Land and Church Acts and English Education.

The ratepayers of London are continually forgetting the old proverb that "you cannot have your cake and eat your cake." They want parks and open spaces, and they object to pay rates for them. The Metropolitan Board propose to carry out an Act of Parliament, and recover part of the cost of the new parks by selling blocks on the fringe of them at the increased value caused by the ornamental grounds. Forthwith parish agitators find texts for their eloquence, and denounce to applauding audiences the very plan which helps to keep down the rates they also denounce. If Victoria Park is too small for the population, the enlargement must be paid for. So, too, in Lambeth, the very parishioners who made out so true and pitiful an account of the river-side parish in perpetual danger of flooding from high tides on the Thames, and prayed for the one sure remedy of an embankment, now, having obtained the object of their prayer, appear in another guise, and protest against keeping the much-coveted roadway in repair. So far this unreasonable agitation has been unsuccessful, in spite of the claptrap about a poor parish. If the Lambeth Vestry can persuade a tramway company to use their embankment, they will escape four-fifths of the expense they dread, and turn an unused road into a valuable thoroughfare to Battersea Park.

The question of whether Irishmen are fit to sit on a jury where their party feelings or their fears are concerned is not a new one, although it has been brought into prominent relief by the monstrous verdict in Kelly's case. The objection to the jury system is not confined to Irishmen. The *Law Magazine* of August, 1859, has the following passage:—"No insurance office resisting a life policy—"no great company resisting a claim for an accident—no lawyer "or doctor suing for his bill—no gentleman contesting the charges "of a tradesman—no landlord suing for a forfeiture—no person "who has rendered himself by any means unpopular, can safely "depend on the impartiality of a jury. The fact is familiar to "every lawyer, and calculated on beforehand. Nay, even a "merchant of London suing a tradesman in a country town is "not safe in a disputed case with a jury of that town. In parts "of Wales a Welsh jury can hardly be got to do justice to an "Englishman against a Welshman." The writer might have gone further, and added that a Welsh jury will rarely convict a countryman in the most clearly proved case of embezzlement of poor-rates or other public funds. "In Ireland, where proved "assassins are acquitted, a verdict of wilful murder was brought "in against Lord John Russell because a poor man had starved "in the time of the famine."

The ingenious Tontine scheme for purchasing Alexandra Park—after a great deal of lecturing, and a great deal of cant about founding a model place of amusement and education for the working classes—has failed completely. This is a pity, for it really is a place of great landscape and horticultural capabilities which it would be well to preserve from the trowel of the villa builder, and dedicate to the use of the large class who can afford eighteenpence for admission and railway fare. These are not exactly the working classes, unless on four or five days in the year, but they form a considerable section of the London population. The failure has brought the original promoter of the scheme, Mr. Francis Fuller, once more into print; this time in the humble pages of a halfpenny local newspaper, the *Islington Gazette*—a terrible descent for one of the leading figures in the International Exhibition of 1851, and its progeny, the Sydenham Crystal Palace. It seems that when, with those very fine words "that butter no parsnips," Mr. Fuller was unable to raise the capital needful for purchasing the park and paying his own not small commission, he handed over his speculation to the really influential directors of the tontine scheme. They failed because the capital was too gigantic for miscellaneous subscription. Eight hundred thousand one pound shares are beyond the swallow of the British public. The working men who attended the meetings called for the purpose of puffing the undertaking, could not find out that they were to have any substantial advantage over those who paid a shilling entrance, and declined to subscribe. But we shall hear of this Tontine principle again. Could it not be used for raising the funds for establishing co-operative stores among working men in those districts where the truck system now prevails?

Mr. Scott Russell, once the *fidus Achates* of Mr. Francis Fuller, has occupied nearly a column and a half of the *Times* in explaining how he came to father the new social movement of seven resolutions, under which the Government was to provide the skilled workmen of England with the very best of dwellings, food, clothing, and amusement, either gratuitously or at cost prices. After wading through Mr. Russell's long-drawn paragraphs, we have about as much information as when we began. Mr. Russell used to be famous for combining the appearance of lucidity with the fact of obscurity; but on this occasion his right hand seems to have lost its cunning, and the clould of words effectually conceals his meaning, if he have any, which is doubtful. Of course, the late Prince Consort's name is brought in *à propos des bottes;* but then, on what subject has Mr. Scott Russell talked or written for the last twenty years without lugging in the name of that amiable, accomplished, and ever-praised Prince? He has long shared this weakness with the late Mr. Serjeant Payne, of doggrel memory. Mr. Scott Russell declares that the ideas embodied in the seven resolutions originated twenty years ago, when he discovered, through the Prince Consort, that "the interests of the working "men of certain States of the Continent were better cared for by "their Governments than our own." Well, if Mr. Russell found this out, he kept it very carefully to himself. On the contrary, for at least fifteen years of the twenty, no one who had travelled in Germany used his assumed information more dogmatically to proclaim the mischief arising in foreign States from the interference of the State in all the relations of domestic life, than Mr. Russell. It would seem, to any who followed the story, that his conversion to the theory of a parental Government acting the part of a particular Providence to working men, only dated from the unfortunate epoch of his difference with Sir William Armstrong, with the consequent proceedings which led to his disappearance from the Institution of Civil Engineers and English enterprises. While Millwall building-yards flourished, and appeared to flourish, the pregnant words of the Prince Consort, and all the lessons learned in the dockyards of Prussia, slept. In 1870, being at leisure, Mr. Russell opened a correspondence with an anonymous peer, moved by the sudden thought that the salvation of Great Britain was to be achieved by the members of the House of Lords. The anonymous peer, like Sam Weller on a similar occasion, thought Mr. Russell's remarks "very pretty," and so the play began. So far it has only ended in laughter and confusion of tongues. But the anonymous lord, if fortunate enough to be also a landed proprietor, need not altogether lose his time. He has at his door agricultural labourers, infinitely more helpless than skilled mechanics. If he will extend to them a cottage and garden at eighteenpence a week, and a lease of cow's grass at the rate of £4 or £5 an acre—which can be done by any Lord of Belvoir, or even less wide domains (without an Act of Parliament)—he will find his paternal arrangements gratefully received and duly acknowledged. There is not the least doubt that many town dwellers are abominably lodged, but it is a question on which a wide, active, influential public opinion is at work, supported by more than one Act of Parliament, each more stringent than the last. Workmen's railway trains have done a good deal for the hand labourers of London; tramways promise to do even more. A league of skilled workmen, to put down public-house waste, to check the rampant political power of the licensed victualler, would find in wholesome savings the funds for more places of healthy amusement and more workmen's building societies. That is a league that is quite on the cards, but we shall not find Mr. Scott Russell sailing in such a matter-of-fact galley. We regret to have to speak in such a tone of a gentleman who, as a man of science, has often instructed and amused the public; but in this case it is too evident that Mr. Russell, having ceased to be an employer, and having a personal quarrel with the employers of skilled labour, has been trying to set class against class, by propagating theories in which up to sixty years of age he had not the least faith. His opinions are well known, or well known before his eclipse, for he has always been a didactic style of man—delighted to find an audience, or even a single listener, to his discourses on the merits of self-help and private enterprise.

The case of the agricultural labourer is very different. It has lately been treated by Mr. Clare Sewell Read, M.P. for

South Norfolk, in a speech delivered at the London Farmers Club—a discourse on which the speaker who followed him termed "an *apology* for the condition of the agricultural "labourer." The farmers murmured at this innuendo, and yet what was the most favourable aspect of the picture painted by Mr. Clare Read, who is, if not the only tenant-farmer ever returned to Parliament, certainly the ablest representative of agricultural prejudices who has ever been sent there? He showed that the normal condition of the agricultural labourer has greatly improved within the last twenty years; that his wages have risen in every county; that, if not encumbered with a family, he can migrate to districts of the highest wages; that the demand for agricultural labour is more constant in winter and the year through than it used to be before the use of machinery became universal. Bread is 10 per cent. cheaper since the repeal of the Corn Laws, so are groceries, and Mr. Read might have added, clothing; butter, cheese, and milk are dearer. The general introduction of machinery into agriculture has increased crops, therefore increased labour, and increased the demand for intelligent labourers to use it. There is a movement on foot amongst rich landowners for providing labourers on every estate with good cottages with gardens. Mr. Read thinks a rood of garden is worth a profit of at least £4 a year to a labourer, or rather more than 1s. 6d. per week. By assuming that every married labourer had a cottage and garden of this kind, by adding piece-work, the benefit of gleaning, and other perquisites not paid in money, Mr. Read satisfies himself that the average labourer makes equal to 15s. or 16s. a week in the midland and northern counties, and that therefore he is better off, if he pleases, than a town labourer at £1 per week, or the Belgian peasant proprietor in his blouse and wooden shoes. The farmers of the London club cheered these conclusions cordially. Mr. Bass assuring licensed victuallers that they were public benefactors for selling as much beer as possible to those who carried their liquor silently, Mr. Rice assuring shareholders that any number of men could be had, for the wages given by the Midland Railway, to work fourteen hours a day, would also be heartily cheered by a sympathizing audience. No slaveowner had ever any difficulty in persuading other slaveowners that the blacks were much more to be envied than white labourers, although the negroes were of a different opinion. Mr. Read completed his life-photograph by stating that the English agricultural labourer had neither thrift nor foresight; that he married, at or before twenty-one, without having made any savings, a servant girl who had rarely put anything by out of her wages; that he spent all he earned, and looked forward to being provided for by the parish, in sickness, when out of work, and in his old age, as a matter of course. The force of class prejudice is so strong that Mr. C. Read, who is not only a most intelligent farmer, but a truly humane and practically religious man, considered this state of things, if not entirely satisfactory, one for which no one but the labourer himself was to be blamed. He ignored, or opposed, or threw cold water on every suggestion that has been made for ameliorating the condition of this chronic pauper. He did not approve of keeping waste pasture open for the cows of the village, assuming that it was not possible to regulate the use of such commons; if he did not sneer at, he damned with faint praise the idea of a cow's grass for every married labourer. He did not approve of compulsory education, or of restraining the children from labour until they were twelve years old. He desired to abolish all beer-shops, but did not propose any places of village recreation and society instead. On the subject of the complicated land-laws, which create so many nominal, almost pauper owners, without power to build a cottage or alienate an acre for any useful purpose, he was silent. He cast a look of admiration backwards to the time of Charles II., when monarchy and aristocracy were all-powerful, and forgot to mention that the pauperized labourer of to-day is the direct descendant of the labourer created by the poor-laws which the squire, the parson, and the farmers have managed in each parish for nearly a century. The fact is that the average agricultural labourer has not intelligence enough to benefit by increased wages when he gets them; he is purposely kept dependent, and having no hope of rising in the world, has no object in thrift. The only savings bank he understands is a bit of land, and that his superiors think would make him too independent; he must not know geography lest he should travel, or arithmetic lest he should compare wages. The great revolutionary war took away his pastures; the law of settlement pulled down his cottage. Very often he cannot even get the skim milk that enables the Irishman with potatoes or maize, and the Scotchman with oatmeal, to rear healthy children in miserable hovels. Education that will make the labourer intelligent, a reform of land-laws that will make the nominal the real owners of land, a wholesome administration of the poor-laws, are obvious remedies for the degraded condition of the class that recruits our armies, and finds seventy per cent. of the unskilled labour in our great towns. The wages of agricultural labour are a matter regulated by supply and demand like all other labour, and neither the farmer nor the landowner can raise them beyond their natural level, therefore the agricultural interest are not answerable for low wages where they exist. But they are answerable for the social condition of the labourer, because they have had all that affects it in their own hands for centuries—education, religious instruction, dwellings, amusements, and not least drink!

Amid the mass of evidence collected by the Truck Commission, the most curious is that relating to the Shetland Islands. In these islands, to a large proportion of the inhabitants, money is unknown; credit is familiar from childhood, and barter is universal, with the cruel variation that the price is always fixed by the creditor. A more poisonous system it is impossible to imagine. That the Shetlanders are, under such adverse circumstances, as respectable as they are, is very creditable to their character and religion. "Almost every fisherman in the islands is in debt to some "shopkeeper. Frequently his wife, and all his children down to "twelve years old, have each separate accounts with him." At the summer fishing the boys of the family are engaged as beach boys; each boy is established in the books of the firm, and is allowed to draw his coat to go to church with. By the time the fishing is over he has overdrawn his account to such an extent that he is to be engaged the next season. This will go on until he is a grown lad, and then he has to go in some boat, and he is trucked away until he is an old man, and then he is trucked away into his grave, unless he happens to "get out of the system by going south." The women being more dependent, are even more under the thumbs of their "merchants." The women who work in Shetland hosiery receive the wool from the shopkeeper, and when they bring it back in a finished state are paid on a certain tariff for each article; but this is a nominal price—they get no cash. The rule is that they are paid in fancy goods, such as clothing, dresses, flowers, ribbons, &c. It is rare that they will give them tea, sugar, or soap. "An instance occurred last week, in which "a girl sent in so much work that, after taking all she required, "the merchant gave her an I O U for the balance. A few days "afterwards she got an order from a friend for a piece of "hosiery of an unusual description. She went to the mer-"chant for the wool, which he weighed out to her, and agreed "for the price of it; but the moment she began to take the "I O U out of her pocket, he told her she should not have the "wool unless she paid cash. He would not take his own I O U "except for dresses or ribbons. He would not let her have "the wool because she was not going to work for him. She had "to go and borrow the money." Some idea may be formed of the profits of these Shetland Shylocks, from the prices of the staple articles: Wool of a shawl, worth 25s., is worth 2s.; the nominal price paid for working is 9s., the real price, in truck, about 4s. In all the stores the same system prevails. A woman from the country brings an article, and agrees to sell it for 1s. or 2s. Then the storekeeper says, "What are you going to take?" The woman says she will take two or three yards of calico, and so on, until twopence or threepence remains; and he says, "What "will you take for the balance?" She says, "Sweeties." "It "finishes up with sweeties. That is the system." To make matters worse, this abominable truck is extended even to the letting of land. The fishermen are generally occupiers of small plots of land, called in Shetland by the old law term of *pendicles*; these they rent, and can only rent, from the chief fishers, at from £3 to £9 a year. The fishers also keep stores for provisions and clothing. The men are expected to take their supplies from these stores, to be balanced against their share of the fishing. Those who do not are not employed again, and are not allowed to rent "*pendicles*." The consequence is they seldom see the colour of money. They have no incitement to save, and no opportunity of exercising economy in their purchases. The whaling business, carried out by shopkeepers, who are agents for the Dundee, Peterhead, and Hull merchants, is worked out on the same system. "When the whalers return after a short successful voyage, it is "the agent's interest that the settlement with the Shetland "men should be delayed as long as possible. So the "agent delays until the man is again in his debt, and he has "no chance of spending his cash balance as he likes." Mr. Edmonston, a proprietor of land in the Island of Shetland, says: "I hope the proposition for not allowing credit to be given will "pass into law; if something could be done to check the facilities "the tenant now has for running into debt, the people would "soon be raised from debt and misery to comparative comfort "and ease. As the system at present stands, a good year for "fishing or for the crops does not mean much cash, any more "than a bad year, but it means little or much debt. The people, "as a rule, do not finger one-fiftieth part of their earnings; three-"fourths of them, as a rule, never see money as payment for "their produce. Such a state of things is utterly demoralizing, "and so long as it is permitted to continue, Shetland will continue "behindhand in every sense."

Circular to Gas Companies.

One of the most serious explosions which have ever occurred at a gas-work happened early in the morning of Monday, Nov. 13, at the works of the Leeds Corporation, situated in Wellington Road, New Wortley, a western suburb of the city. These works formerly belonged to the Leeds Old Gas Company, and were taken over by the Corporation in the early part of the present year. While waiting for the evidence to be produced at the inquest on an unfortunate man who was killed—happily the only victim—our opinion as to the cause of the accident must be more or less conjectural, though the reports already published leave little doubt as to its true origin.

The works at New Wortley are unfortunately very crowded. The purifying-house is in close contiguity to the retort-house, and near by are the engine and boiler houses. The retort-house contains 280 retorts, which were all in operation at the time of the accident. The purifying-house is a building about 60 feet in length and 42 feet wide, having 18-inch walls, carrying a slated roof of the desciption known as a "jack roof," the ridge being raised, boxed, and open for ventilating purposes. It contained four purifiers, each 22 feet by 16, resting on brick pillars, the foot space all round them being, we gather, floored with wooden boards, under which passed all the connexions, including, of course, the inlet-pipe from the exhauster. The inlet-pipe in one corner of the building was drained by a self-acting syphon, with dip-pipe into an open overflow cistern. To this place an escape of gas was traced, which had been going on, according to the witnesses, for from twenty minutes to three-quarters of an hour. The cause of the escape can hardly be doubtful. It will be at once surmised that from some obstruction, either in the purifiers or connexions, the seal of the dip-pipe became insufficient to resist the pressure of the purifiers; the water was therefore blown out, and the gas escaped into the enclosed space between the bottoms of the purifiers, the wooden flooring, and the ground.

The manager, Mr. Scholefield, whose promptitude and courage were beyond all praise, at once took steps to correct the defect by endeavouring to fill up the syphon-box with water; but the cistern could not be got at without removing some of the wooden flooring, and on doing this a vent was given to the pent-up mixture of gas and air, which made its way to the boiler-furnace, and there became ignited. The result was an explosion, which for its destructive effects has seldom been equalled in gas-works. The roof of the purifying-house was utterly destroyed, two of the purifiers were completely shattered, and the other two are greatly damaged; the centre-valve and connexions were all broken to pieces. Nor was the damage confined to the purifying-house. Behind it was a shed, the roof of which was blown away, and alongside, though partially separated by walls, were two large scrubbers and the condenser; the former are destroyed, but the latter escaped uninjured. At a distance of 30 feet from these is a gasholder, the crown of which had a rent made in it 10 feet long; this, however, was promptly stopped with clay, and the stock of gas saved. In the open yard in front of the engine-house were two other smaller purifiers exposed to the air, and these also were completely destroyed. The explosion, of course, ignited the gas at the place of escape, and it continued to burn until the charges of the 280 retorts were drawn, under the direction of Mr. Smith, the engineer to the Corporation.

It is too early, perhaps, to comment fully on this disaster, but we may point out at once the advantages and safety of the plan first practised by the late Mr. King, of Liverpool, who erected his purifiers on a stage with an open space below. When such a space is enclosed by four walls, it necessarily forms a sort of close end, in which an explosive mixture accumulates, and gives force to an explosion if the mixture should happen to be ignited. Mr. King's plan, which has been adopted in all recently constructed works, will doubtless be followed when the Leeds works are rebuilt.

The explosion naturally created great alarm in the neighbourhood of the works, and even one of the workmen seems to have regarded the gasholder with as much fear as he would a powder-magazine under the circumstances. The next night that part of Leeds supplied from the Wortley works was very imperfectly lighted, but we learn that by the energy of the officials, connexions have been made with a smaller set of purifiers left uninjured by the explosion, and a full supply will be immediately resumed. Those people who imagine that corporate management is a safeguard from every accident, will learn that corporations are no more exempt from such disasters than gas companies. We shall wait with much interest the report of Mr. Arnott, who has, we see, been appointed by the coroner to make an investigation into the causes of the accident.

Silly people will see in a rare accident of this kind a strong argument for the removal of gas-works from towns, though there is much less danger in connexion with them than with the steam boilers numerous in every street of a manufacturing city. These often burst, dealing death and destruction around them, but no one is so foolish as to demand their removal.

On the same morning a small explosion occurred at Leighton Buzzard. A ½-inch service-pipe had been screwed into a 2-inch main, and cracked it. The escaping gas found its way into a pipe-sewer, and thence up a sink-pipe into a washhouse, and up an overflow-pipe into a water-tank. A light applied to the sink-hole by a curious servant-girl ignited the mixture of air and gas, and caused an explosion, which blew the stone cover of the water-tank some 15 or 20 feet into the air, and cracked the brick tank itself. The accident would hardly be worth noticing except to combat the prevailing ignorance in the neighbourhood, which persists in believing that a mixture of gas and air will explode without a light being applied. In this case, in spite of all assertions to the contrary, we must believe that the mixture was thoughtlessly fired. The moral for the manager is that even a 2-inch main is so weakened by the insertion of a service-pipe as to render it unsafe.

The parliamentary notices for the coming session, which are now in course of publication, inform us that The Gaslight and Coke Company (Chartered) intend to apply for leave to introduce a Bill to repeal section 59 of their Act of 1868, and similar provisions in the schemes for the amalgamation of the City of London Gas Company and the Great Central Company, and authorize them to apply any money which may come into their hands, on the sale of lands not necessary to their undertakings, to the erection of new works. Power will also be asked to raise additional capital by the creation of new stock or shares, and it is wished to make better provision for the recovering of gas rates or rents from time to time owing to the company. A notice has also been issued to shareholders, convening a meeting to sanction the issue of £300,000 of new capital.

A very comprehensive notice by the Phœnix Company expresses their intention to introduce a bill to confirm agreements made for amalgamation with the South Metropolitan Company and Surrey Consumers Association, to unite the share and loan capitals of the three companies, and increase such capital, and adjust the priority of shareholders and bondholders in the united capital, and to enable the company to provide a reserve-fund for equalizing the dividends, as well as a fund to meet special contingencies. A further prospective amalgamation of a very extensive character is shadowed forth in the notice which announces that the Bill will ask power to enable the company to supply gas in bulk to, and amalgamate with every other gas company in the metropolitan district on the southern side of the river, enumerating them all, and reciting the several Acts relating to them—18 in number—all of which it is proposed to alter, amend, extend, enlarge, and, if need be, repeal. The Phœnix, after all this, naturally wishes to change its corporate name. It may be doubted whether the consumers south of the Thames will regard this grand scheme with perfect equanimity. So far, amalgamation in the metropolis can hardly be said to have resulted in any benefit either to companies or consumers, and it is difficult to see what will be gained by converting the supply of south London into one huge monopoly. It may, however, simplify matters for the corporation of the future which is to absorb the entire supply of the metropolis.

A correspondent inquires the cost of obtaining a Provisional Order under the Gas and Water Works Facilities Act. It will depend on circumstances, but may be estimated at about one-third the cost of an unopposed Act of Parliament for a company whose capital is less than £100,000. An order would not reduce the dividend on the *original* capital below 10 per cent., but in all probability would limit the dividend on any additional capital it might authorize to be raised to 6 per cent., if the new shares issued were preference, and 7 per cent. if ordinary.

The agitation in the North of England for shortened hours of labour has spread to the firemen employed in the gas-works of the Leeds Corporation, who have petitioned the council to reduce the hours of work from 84 to 56 in the week, or 8 instead of 12 hours per day.

We have before us a new edition, the hundred and ninety-eighth thousand, of Mr. Rutter's little work on the "Advantages of Gas." It seems extraordinary that a work of this kind should be called for in these days, yet daily experience shows how completely ignorant the majority of people are as to the nature of gas, its safety and its cheapness as a source of light and even of heat. The section on "An Escape of Gas" is alone calculated to save many lives and much property, if the suggestions there made were always acted on—if, when people perceived a smell of gas about a house, they would open the doors and windows, turn off the main tap, and send for a gas-fitter, instead of immediately striking a lucifer to look for the leak.

There is sound advice, too, in the section "On Gas-Fittings,"

especially in the recommendation to consumers to have pipes of sufficient size provided. At least one-half of the complaints of deficiency of supply are owing to the smallness of pipes laid to furnish it. So with regard to burners and glasses. Mr. Rutter says, with truth, that "to badly-made burners, and inappropriate "or neglected glasses, may be traced the principal part of the "complaints about gas. Whilst its illuminating power has been "increased and its price reduced, the consumers, for whose "benefit it is intended, are not realizing what is provided and "intended for them; nor will they unless fittings, burners, and "glasses receive proper attention."

Mr. Rutter is a strong advocate of the use of gas for cooking and warming, and as it is very desirable to extend the consumption for the former purpose in the summer months, some space might well have been devoted to a short account of some of the best apparatus to be used. Frying or broiling over a gaslight is a simple operation, but few people are acquainted with the simple and economic apparatus for baking and roasting, which they might be glad to adopt in summer, when a fire is required for no purpose but cooking. We have often urged upon gas companies the duty of advising their new customers on the best arrangements to be made for the consumption of gas, and we do not know that they could do better than put this little book into their hands.

Correspondence.

SUGGESTIONS FOR THE SAFETY OF GAS-WORKS.

SIR,—Will you oblige me by inserting, in the next issue of your valuable JOURNAL, a few suggestions relative to the protection of life and property in connexion with gas undertakings, the adoption of which, in my opinion, would prevent (under the care of a judicious manager) further disasters arising from the causes which have recently thrown the gas world into a state of anxiety and alarm.

I would suggest that a pipe of sufficient size suited to the capacity of the works be fixed, say at the end, on the top of each separate hydraulic main, with a valve attached thereto, the pipe to be conducted in a perpendicular direction through the roof of the retort-house, the valve, of course, being always closed during ordinary working.

In case of an obstruction in the pipes, or an escape occurring, which too frequently results in an explosion, the said valve should be opened to allow the gas passing from the retorts to evolve by way of the safety-pipe. The valve on the ordinary discharge-pipe should then be closed, together with the inlet of the gasholders, which would shut off all communications with the various appliances, and thereby cease to feed such explosion, and give the engineer an opportunity of making his investigations and repairs without risk, which, if such course were adopted would do away with a vast amount of trouble and inconvenience by disposing of the gas issuing from the retorts in full operation at the time.

I would further suggest that the tap or valve on the top of the purifying vessel at the extreme end of the appliances, before the gas passes to the station-meter, should also be opened, which, I think, would be found an advantage, especially in connexion with large works.

Fortunately, in my case, I have a set of two purifying vessels at a considerable distance from the ordinary purifying-house, in an open shed, and can adopt this practice without risk or inconvenience.

JAMES MOON, *Engineer and Manager.*

Gas-Works, Scarborough, Nov. 17, 1871.

Legal Intelligence.

VICE-CHANCELLOR'S COURT.—TUESDAY, Nov. 7.
(*Before Vice-Chancellor* MALINS.)

WEBSTER *v.* CORPORATION OF HALIFAX.

Mr. GLASSE, Q.C., and Mr. MARTINEAU appeared for the plaintiffs; Mr. COTTON, Q.C., Mr. JACKSON, and Mr. HIGGINS for the defendants.

Mr. GLASSE, in opening the case, said the plaintiffs were Samuel Webster, of Glen View, of Wheatley, in the borough of Halifax, gentleman; Isaac Webster, of Buckley Gate, in Ovenden, in the borough of Halifax, brewer; George Henry Webster, of Clough House Ovenden, brewer; and Samuel Green Webster, of Glen View, brewer; and the bill was filed against the mayor, aldermen, and burgesses of the borough of Halifax. Samuel Webster, the elder, was entitled in fee simple to a brewery called the Fountain Head Brewery, in Ovenden, and the several farm buildings, cottages, and closes of land adjoining, and known as Clough Farm and Broadley Hall Farm. On the westward the ground rose all the way from the brewery, but very rapidly at the back of the aqueduct, from the land to the westward, of which the plaintiffs obtained a very considerable supply of soft pure spring water for brewing and for domestic purposes. Their supply was intercepted by the works of which the bill complained. The three last-named plaintiffs carried on business in partnership as brewers, and they occupied the brewery as tenants from year to year of Samuel Webster, their father. Before 1838, John Mitchell was the owner in fee simple of the whole of the premises which now belonged to the plaintiffs, and also of the land to the north and north-west, of which the corporation were now the owners. The land was held by him, however, subject to an indenture dated the 23rd of October, 1792, by which certain springs of water in that part belonging to the defendants, which was called Dodgen Clough, and certain rights and privileges for collecting and taking away the same, were granted to their trustees, acting under certain Acts of Parliament, for supplying Halifax with water. In 1838 the Fountain Head Brewery and Clough Farm were demised by John Mitchell for 21 years to Samuel Webster, who carried on the business of a brewer there until about a year ago, when he retired. The brewery and Clough Farm were from the time that Samuel Webster became the tenant supplied with soft spring water, which was derived in great abundance from three springs situated in a close called the Ing, part of Buckley Lane Farm, part of the premises formerly belonging to John Mitchell, and now belonging to the defendants, and by the lease from John Mitchell the use and enjoyment of the water from these springs were expressly granted to Samuel Webster. Mitchell died in 1843, and in August, 1850, the whole of the premises now belonging to Samuel Webster and the defendants, subject, however, to the indenture of 1792, were offered for sale by public auction. Samuel Webster was desirous of purchasing the whole, but the corporation, in whom, under the provisions of certain Acts of Parliament, the springs of water in Dodgen Clough had become vested as trustees for the purpose of supplying Halifax with water, desired to purchase Buckley Lane Farm and part of Dodgen Clough. In the result it was arranged between Samuel Webster and Mr. John Crossley, acting on behalf of the corporation, that the corporation would not bid against the plaintiff at the sale, and that in the event of his becoming the purchaser he would resell to the defendants, at 30 years purchase, the part which they required, they securing to him the use and enjoyment of the water from the three springs in Buckley Lane Farm. Accordingly, as set forth in the bill, Samuel Webster bought the whole, and then resold to the defendants the portion that they wanted, and by a deed dated April, 1851, that portion was conveyed to John Squire Gray by mortgage, subject to the reservation to Webster of the free and uninterrupted use and enjoyment of the springs of water in the close called the Ing; the water to be conveyed in covered drains or culverts through the close into land belonging to Webster. From that date until 1856, when the defendants constructed the culvert, to which he would presently refer, the brewery premises and Clough Farm were abundantly supplied with soft spring water, and there was sufficient, not only for those purposes, but also to turn a water-wheel used for grinding malt, pumping, and hoisting. By the Halifax Improvement Act, 1853, the corporation were empowered to take and use certain lands, streams, and waters, or any easement, power, or authority, in or over the same, as they might think requisite for the purposes of the Act, and under those powers they proceeded to construct a subterraneous conduit through Clough Farm and other lands belonging to Samuel Webster. His honour must understand that the old conduit so constructed he (Mr. Glasse) was not there to complain of. Their new work it was of which he complained. The compulsory powers of the corporation under that Act of Parliament had gone. What they did under the old Act he had not a word to say against, because the old conduit was puddled and made water-tight. There were drains under it and over it, by which all the rights of the plaintiff were preserved, and he got all the water from the western side, none of it flowing into the conduit. The construction of the conduit obstructed, diverted, or absorbed the water from the spring in Buckley Lane, to the serious injury of the brewery premises, and arrangements were come to by which the defendants were to purchase from Webster a certain piece of land and the right of constructing the conduit through his property, they granting to him by way of compensation for the abstraction of the water of the spring referred to, the use and enjoyment of the springs belonging to them in Dodgen Clough, by means of cisterns to be placed in their lands and in his. This was the deed which limited their rights, and which they had not observed. It was dated December 31, 1856. It set forth that in pursuance of the powers vested in them for the purpose of the water-works, the defendants had contracted with Webster for the absolute purchase of the said piece of land, and that "in order to put an end to all questions with regard to the alleged abstraction, diversion or absorption of the said spring, and to provide a compensating supply of water for the loss thereof, it had been agreed between the defendants and the plaintiff, Samuel Webster, that after a sufficient supply of water for domestic purposes, cattle, and farm buildings at Buckley Lane Farm, should have been from time to time provided from the cistern already constructed in the field called the Bank, by a metal pipe of ¾ inch internal diameter, running from the cistern to the farmhouse, buildings, and cattle yards, into another cistern or trough in the farmyard, such cistern or trough being so placed and secured that the water flowing to it should not at any time run to waste, and the surplus water flowing from the first cistern should be conveyed by metal or pot piping of at least 3 inches internal diameter, well jointed and secured, to another cistern already constructed in the wood adjoining the close called the Bank. And from such last-mentioned cistern the surplus water shall be conveyed or conducted by or through a metal pipe to be fixed into the cistern, of 3 inches internal diameter at its junction, and for the residue of its length half an inch internal diameter, and to be so placed in the cistern, and of such sufficient length as to take so much of the water flowing into the cistern into the drain or conduit belonging to Samuel Webster on Clough Farm. It stated "that by reason of the exclusion of the water and the construction of the aqueduct therein mentioned"—(the aqueduct "therein mentioned" was carefully limited in size and dimensions;)—the defendants had exceeded their dimensions and taken part of the plaintiff's water from off his land. The defendants were conveyed the "right, easement, or privilege of constructing, laying, or placing, and for ever afterwards continuing a subterraneous conduit-pipe, not exceeding 4 feet in width by 4 feet in depth, on the said parcel of land."

The VICE-CHANCELLOR: You say they have exceeded those dimensions.

Mr. GLASSE: Considerably. Ever since the bill was filed they have taken away our water. It goes on to say that they have made man-holes in the land. There is provided the right to enter for the purpose of substituting for the conduit "any other subterraneous conduit or pipe, provided the same be carried within the said limits of the said piece of land, and that it do not exceed the dimensions before mentioned." Whether they have done so or not your honour will judge from the evidence. And it goes on to say: "And also, for the purpose of preserving and repairing the man-holes, the defendants shall make reasonable compensation to the occupiers or owners," &c. And further, "The corporation were to have the right to use and enjoy the water diverted from a close in Buckley Lane Farm." Therefore the plaintiffs gave up the water in that close, but nothing else; and in lieu of this the corporation gave to the plaintiffs the right to spring water—that is to say, "a sufficient supply of water for domestic purposes to the farm buildings should be provided for, a metal pipe to be secured, fixed, and repaired and kept in repair by the defendants." Then the defendants were to build a cistern, and the plaintiffs were to have the right of examining, and in case of leakage were to repair; and, if not, then the plaintiffs were to do it, charging the defendants with the cost. The conduit to be constructed by the defendants was to have "wall stone sides, and so puddled as to make it water-tight so long as it passed through the lands of Webster." There was to be a mere tunnel, which would not take in any of the water from the westward; and the flow of such water from the westward to the eastward to the brewery was not only preserved, but it was to gain certain surplus water.

The VICE-CHANCELLOR: Do you say that that is measure of their easement under the old Act?

Mr. GLASSE: I do. And I say that they have not only intercepted those drains and carried the water from the other place, but they have actually got into their tunnel all the means of obtaining water for our brewery—at least 100,000 gallons per day—which they carry away and sell at Halifax.

The VICE-CHANCELLOR: How has your brewery been supplied lately?

Mr. GLASSE: We have frequently ceased work, and we have been indebted to the kindness of our neighbours for water.

The VICE-CHANCELLOR: I suppose that your evidence goes to show that you have a less supply of water than you had before the new works were commenced.

Mr. GLASSE: Oh, yes; enormously less. To continue; the bill states that "several years ago the defendants reconstructed the conduit, and there has been no water from the spring at point B, which was previously copiously sup-

plied with water, and the water so obstructed and diverted had thus been dried up at point B, and the brewery premises were not only deprived of the water at point B, but also at the other places." So that your honour will see the materiality of the diminished supply which was alone derived from our own land. Webster frequently complained of the abstraction, but the corporation took no notice of it. Then we come to the particular water abstracted. It says: "A considerable quantity of water arising from the plaintiffs springs which lie on the west side of the conduit was taken away."

The VICE-CHANCELLOR: Is the water from the west side the particular count charged here?

Mr. GLASSE: Yes; as far as the water privilege goes.

The VICE-CHANCELLOR: What you complain of is the abstraction of water from the west?

Mr. GLASSE: Yes; from there and down further to the south of A and B. The lands of the west slope to the conduit, and the water flowed partly over and partly under the conduit; and by the old means Webster obtained a considerable supply of water, which, to some extent, compensated him for what was taken from him at A and B. The defendants had abstracted the water from point B, and the waters flowing into the reservoir, and the other water, which was absolutely necessary to enable the plaintiffs to carry on their business of brewing. In September, 1870, the defendants began to take up their conduit, passing through the plaintiffs lands, but in consequence of the quantity of water collecting in the tunnel they discontinued it till March or April, 1871. Shortly after the conduit had been commenced, the plaintiffs observed the flow of water from the west was considerably lessened. Webster went up the conduit, and he then discovered that a number of pipes of 4 inches diameter had been inserted in the masonry of the reconstructed tunnel for the purpose of diverting the water from the plaintiffs' land into the conduit, and the water so abstracted had been taken to Halifax. These pipes would drain the water into the tunnel, and the defendants now said that that was for a mere temporary purpose.

The VICE-CHANCELLOR: But they have discontinued it now?

Mr. GLASSE: No; they have only broken off the pipes, still leaving them to be used.

The VICE-CHANCELLOR: They do not now set up the claim.

Mr. GLASSE: But they retain the hole in the pipes so made. The inspection proves that whilst they were walking up the tunnel, a number of spouts or streams of water came in at the place where those pipes are placed, and you will find in the evidence that at least 200,000 gallons per diem are abstracted from our land, and flow into Halifax.

The VICE-CHANCELLOR: You say that the water from the west used to pass under or over the land, but that now it passes through the tunnel, and, therefore, the quantity of water is diminished. Mr. Cotton says if they took the water in this way, it was only temporary, and the work having now been discontinued, they do not now claim the right of making holes in the tunnel. I think in this case I suggested an independent inspection as the proper way of settling the matter.

Mr. COTTON: We are quite agreeable to that.

The VICE-CHANCELLOR: If they would undertake that no water coming from the west shall be allowed to flow into this tunnel, then the question would resolve itself into one of damages, and the costs of this suit.

Mr. GLASSE: There are one or two other points which might be subjects of damage or action. We want the tunnel to be water-tight. There are 30 or 40 places where the broken pipes are put in; and I shall show that an enormous amount of water was abstracted.

The VICE-CHANCELLOR: I want to know whether any part of the tunnel rose above the surface from the west to the east.

Mr. GLASSE: No, nowhere. It was from 3 to 20 feet below the surface.

Mr. COTTON: It is in evidence that the bottom of the old tunnel is the base of the new tunnel.

The VICE-CHANCELLOR: You have a right to say that the corporation have no right to have more than 4 feet square.

Mr. GLASSE: It is not a serious matter to determine; but these are to be matters of compensation. There is another thing in evidence which they call a syphon; and this is also used for taking a quantity of water from the plaintiffs land. Your honour will find that this case eminently calls for a reasonable arrangement; and although this public body has exceeded its powers it is fitting and right to make some reasonable compensation.

The VICE-CHANCELLOR: I understand Mr. Webster naturally wants a proper supply of water for his brewery; and if he gets a proper supply that is all he can reasonably expect.

Mr. GLASSE: I am sorry to say that the effect upon the plaintiff's—Mr. Webster's—health, has been such that he is not able to attend to anything through it.

The VICE-CHANCELLOR: This seems a reasonable thing to do. Some engineer should inspect the works, and say what ought to be done for the purpose of giving Mr. Webster the quantity of the water he requires; and if the corporation get the same quantity of water, what matters it to them? After the additional supply of water, the question of costs is nothing. There will, of course, be the compensation for the damage already sustained.

Mr. GLASSE: If Mr. Webster's rights are defined as arising from the water on the western side, I should think the framing of the order would not be difficult.

The VICE-CHANCELLOR: That doesn't seem to be disputed.

Mr. COTTON: I do not like to speak out of my turn, but our case is that the old conduit is so constructed that Mr. Webster got all the water out of it; and we have made the present one water-tight. I think I shall satisfy your honour.

The VICE-CHANCELLOR: Do you deny that the reasonable thing is before the new works are commenced that you should agree upon something to be done? Let it be arranged, and let the corporation give Mr. Webster what is wanted.

Mr. GLASSE: Your honour will find it difficult to make an arrangement with them. To proceed: the corporation had introduced a longitudinal pipe along the sides of the tunnel, and this they had tried on with a Mr. Gledding, but they were not successful. As soon as this pipe on plaintiffs land was discovered, Mr. Webster complained to Mr. Norris, the town clerk, and to the Water Committee; and he insisted on removing the pipes, or that the corporation must give him a supply of water out of the new conduit. Mr. Hutchinson said they were not aware that they had done anything wrong, but they would meet Mr. Webster. The committee met Mr. Webster, but at that time it was not practicable to get up through the conduit. Only two of the pipes could be seen, and these were on the western side. Mr. Webster explained to the committee that there were a number of other pipes. To this the committee made no reply, but asked a number of questions; and ultimately Mr. Webster made an offer that if the corporation would prefer, instead of taking up the pipes, to give a bore of $\frac{3}{4}$ of an inch through the tunnel to supply his brewery, he should be satisfied. The offer was made to the town-clerk, and he promised that there should not be any further pipes made to the conduit. No reply was made to that offer, and the defendants proceeded with the conduit. Mr. Webster complained, and said that the pipes must be pulled out, but, instead of pulling out the pipes, the defendants pushed on the work; and, on the 1st of May, the plaintiff and his solicitor waited upon the town-clerk, and told him that, unless they got a satisfactory settlement, they would apply for an injunction to restrain them from proceeding with the works. They promised to stop the works until the committee had informed the plaintiffs of their decision. On the 2nd of May, Messrs. Wavell (solicitors) wrote to the Water Committee: "Mr. Webster has again been with us this morning, and he states that the interference with his water rights are much more serious than it was at first thought, and unless it is decided that the water shall be allowed to flow in the course from which it has been illegally diverted, Mr. Webster will have recourse to law. The acts complained of are indefensible." On the 3rd of May the committee met, but no communication was made to Mr. Webster. The following correspondence then passed between Messrs. Wavell and the town-clerk. Messrs. Wavell said: "Unless we receive an answer, our instructions are to proceed for an injunction." The town-clerk replied: "Without admitting your clients claims, I am instructed to inform you that the engineer will plug up and secure the pipes, so that the tunnel may be made practically water-tight." The tunnel had not been plugged up, and streams of water came into the tunnel from these pipes. Besides these pipes the defendants had made pot-pipes, and these they had for a distance of 48 yards alongside the conduit, at the southern end of Webster's land, and they feed the pipes in the upper surface, so as to intercept the water from the lands of Webster. The bill goes on to state—"That on the evening of the 4th of May, a workman, in the defendants employ, passed through Webster's land, and made his way up the conduit, and ascertained that pipes were inserted into the masonry, so as to intercept and divert the water." There were sixteen, ten of which had wooden plugs, whilst the others were open. On the same evening the engineer of the corporation gave instructions to the defendants workmen to take up the pipes inserted into the wall of the conduit, but no directions were given as to the pipe alongside the conduit. Some of the pipes inserted in the wall were taken out, and others were broken off, leaving the pipes in the masonry, and although stones were placed in the masonry, such stones were so put in that water flowed through the pipes into the tunnel. The pipes so taken out, and broken off, were not properly or effectually closed up, so as to prevent water flowing from the land of Mr. Webster to the conduit. The water has been dried up to the west side of the tunnel, to the great injury of the plaintiffs. The plaintiffs have been more than once, through the unlawful acts of the corporation, compelled to cease brewing.

The VICE-CHANCELLOR: Is that true?

Mr. GLASSE: I am told that it is so.

The VICE-CHANCELLOR: Is there any other year they have ceased working for want of water?

Mr. GLASSE: No, never.

The VICE-CHANCELLOR: Was there before the construction of the new works?

Mr. GLASSE: Never. It appears that they have been indebted to the kindness of a neighbour for their supply of water.

The VICE-CHANCELLOR: That is a striking fact. It was not a particularly dry spring. May is not a month when water is generally deficient.

Mr. GLASSE: They say that we have got their leakage. But when we applied to them we got nothing, and we were obliged to fall back upon the kindness of a neighbour for the supply we had lost. Well, the bill goes on to say: "The defendants allege that the pipes inserted in the conduit were only inserted temporarily, to enable them to reconstruct the conduit, and it was never intended that the same should be permanent. But the position and mode of inserting the pipes showed that they were there for the express purpose of intercepting the water." The defendants are about to reconstruct the conduit on their own lands, and for this purpose they have within the last few days laid down rails over the land of the plaintiff, Samuel Webster, for the purpose of running waggons to their land, and they threaten to continue to do so unless restrained by injunction. They have taken, as I will show, something like 100,000 gallons per diem from Mr. Webster's land, and the water is being carried into Halifax and sold at say 6d. per 1000 gallons, making 50s. a day. But it is not a question of amount and amount only—I am seeking to establish the right of the plaintiffs to the water.

The VICE-CHANCELLOR: I do not understand that they contest his right to the water. They have a right to construct a drain or conduit 4 feet square, and as long as they keep the dimensions and keep the conduit water-tight, you cannot complain.

Mr. COTTON: I say the corporation never have done, and never intended to do anything to intercept the plaintiffs water. If in the work anything has been done to the injury of the plaintiffs by abstracting the water or otherwise, the deed provides for compensation.

Mr. GLASSE: It is not the object of the suit to ask relief for injury necessarily caused in the construction of the work, or any temporary damage. This would not be the proper remedy. But we say that what they have done has been done intentionally, and it is a permanent injury for which we seek a remedy.

Mr. COTTON: I repudiate, on the part of the corporation, any intention to intercept the plaintiffs water. They made the conduit with all proper precautions, and for any injury unwittingly done compensation is provided for.

The VICE-CHANCELLOR: It is difficult to suppose that the corporation would intentionally avail themselves of the property of the plaintiffs.

Mr. GLASSE: I am not here to put before the court as a ground for relief any temporary injury caused in the construction of the works. I am asking your honour to restrain them from abstracting thousands of gallons of our water and selling it as their own. I do not care whether the injury is done intentionally or unintentionally.

The VICE-CHANCELLOR: The intention is immaterial if the effect is to deprive you of your water.

Mr. COTTON: We admit that we had no right to interfere with the plaintiff's water, and if he has suffered any injury in that way there is provision for compensation. I think your honour will be satisfied that it is made as thoroughly as a good engineer could make it.

The VICE-CHANCELLOR: You put the plaintiff in the same situation as if you had put down a square iron pipe.

Mr. COTTON: I cannot say that, because water can be forced through iron. When the conduit is made there may or may not be parts where water can be forced through, but what I say is that I have no right to take the plaintiffs water or to do anything with the object of taking it. I have a right to make a conduit, but I must do it in a workmanlike way, and any injury which he may suffer in the construction is provided for by the deed.

The VICE-CHANCELLOR: The substantial question will be, what is the present condition of the works?

Mr. MARTINEAU proceeded to state the substance of the affidavit filed in support of the plaintiffs case, passing over the affidavit of Mr. Samuel Webster, filed on the 9th of May, as he stated that it was merely a re-echo of the bill. The next affidavit was that of Mr. Horsfall, engineer, filed at the same date, which verified the plan attached to the bill, and showed that the Fountain Head Brewery drew all its water supply from a large extent of table-land to the westward of the plaintiffs property, the water being collected in drains and channels, and then conducted to the brewery. These works were fully explained by the witness, who went on to state that in 1856 the corporation constructed a tunnel through Mr. Webster's land, the conduit being about 3 feet high by 24 inches in width. The walls were of stone, and were protected by a puddled trench to prevent Mr. Webster's water draining into the conduit. Mr. Priestley Freeman, of Broadley Hall Farm, stated that in the most droughty summers he had never known the springs fail from which Webster derived his supply of water, and he also spoke of the interception by the new conduit of drains, which he assisted Mr. Webster to make about twenty years ago. Hesselden, a labourer at Broadley Farm, deposed to the laying of the 16-feet pipes, into ten of which, he said, wooden plugs were inserted at the opening into the tunnel, but the other six remained open, and water flowed through them into the conduit. One pipe he noticed was placed under a drain on Mr. Webster's land. Samuel Webster, the younger, Joseph Shaw, formerly contractor for the

corporation, and Mr. Foster, of Manchester, engineer, also gave evidence in support of the statements of the bill, the last-mentioned witness quoting a statement made on behalf of the corporation, that the pipes were inserted, not as permanent works, but merely for the purpose of freeing the conduit from water during the construction. The next affidavit was that of Mr. Horsfall, the engineer, who said that on the 9th or 11th he inspected the works of the corporation, upon which several workmen were engaged, and his belief was that, although the pipes were reported to be water-tight, the water would find its way through the mortar. In his opinion the pipes must have been intended as permanent works, and the effect had been to draw the water off the plaintiffs' land; and he was decidedly of opinion that if such pipes were required there would be always a great risk of leakage. If the defendants had intended to preserve the water to the plaintiffs, the proper method would have been to lay an open drain, one that would have relieved the workmen from all inconvenience. Altogether he thought the course taken by the defendants was one extremely prejudicial to the plaintiffs. He now came to the affidavit of Mr. Samuel Webster, who stated that during the afternoon of May 22nd he conferred with Mr. Borrie and Mr. M'Millan. He stated to them that he desired no litigation, and that if a plan proposed at the interview, and which would have the effect of removing the injuries he complained of, were carried out without delay, he would raise no further objections; but that he would not suffer further delays. It was arranged that he should receive an answer on the morning of the 3rd, when he was informed the committee would consider the proposal, but no communication in the shape of an answer had been received by him. The affidavit of Mr. Isaac Webster stated that Mr. Norris, the town-clerk, said he thought the pipes had better be taken out, and at a subsequent interview he promised that all the pipes would be removed, but instead of that being done more were added. Mr. Roberts, in his affidavit, stated that he could find no evidence of the matter having been under the consideration of the committee on the date referred to. These were all the affidavits which had been filed on behalf of plaintiffs, and he would now leave the court in possession of the facts, and refrain from further comment until there had been heard the affidavits filed by defendants in answer.

Mr. COTTON, Q.C., said the first affidavit he had to read in answer was that of the town-clerk of the Corporation of Halifax, Mr. Norris, who, at the outset, referred to a waste in the water supply which had been pointed out by the engineer, Mr. Borrie, and the necessity which existed of remedying the defective conduit. In the month of March last the plaintiffs first appeared before the Water-Works Committee of the corporation, and stated the grounds of their complaint with regard to the conduit. The committee received them with every courtesy, and appointed some one to meet them on the ground, this being the first intimation of interference with the water rights of the plaintiffs. Accordingly a visit was paid, he (the town-clerk) and the mayor being amongst those present, and on two of the pipes being pointed out as objectionable, plaintiffs were assured that nothing would be done which would affect their legal rights. It was explained that the pipes were not intended to be permanent, but were inserted in order to keep the water from percolating from the wall, and would eventually be removed. From what cause he could not tell, the plaintiffs appeared to be dissatisfied, and on the 2nd of May he assured them again that the pipes were only temporary; and he gave an assurance that the work would be stopped until the 3rd of May, when the committee of the corporation met, and when he was instructed to write to plaintiffs solicitors, stating that the engineers had orders to secure every opening in the conduit, so that it might be water-tight, but that the corporation denied that they had done any act of damage. The learned counsel was proceeding to read the correspondence on the subject between the town-clerk and plaintiffs solicitors, when

The VICE-CHANCELLOR observed that this was a cause which, after what had been shown, should not occupy the court two minutes longer. The defendants said, as he learned from the affidavits made and from the correspondence between Mr. Norris and the plaintiffs solicitors, that they had no intention of interfering with his water right, and he did not see why an agreement should not be come to.

Mr. COTTON: We told them so all along.

The VICE-CHANCELLOR: You had better give an undertaking not to do so, and there will be an end of the matter. Then it would be simply a question of the costs of the action. Mr. Norris has said, "We do not intend to do you an injury, and all you want you shall have." I think the matter had better be settled between you.

Mr. COTTON said his contention was that plaintiffs were wrong altogether. They were not satisfied to dismiss the bill without costs. The bill was filed after an assurance was given that these works were only temporary, and that the works would be finished to Mr. Webster's entire satisfaction.

The VICE-CHANCELLOR suggested the appointment of an independent engineer to see that the arrangement was carried out.

Mr. GLASSE: We will agree if they will undertake to pay the costs.

As the parties could not come to an agreement with respect to the question of costs, the reading of the affidavits was continued.

Mr. BORRIE, the borough engineer, deposed that, acting on instructions, he made an inspection of the water-works, and found the original conduit in such a state that large quantities of water escaped; and he, therefore, advised the corporation to reconstruct it. The new conduit was properly constructed, and he denied that the corporation had executed any works of a permanent character by which the plaintiffs would be deprived of any of their privileges. Farther than that, the corporation instructed him to take care to keep secure the water of the plaintiffs, and every endeavour had been made to obey those injunctions. Alderman Hutchinson, chairman of the Water-Works Committee, explained in his affidavit that the works were of a temporary character, and that assurance of that had been given to the plaintiffs; and Mr. Pascoe's evidence was to the effect that the new conduit would form a perfectly water-tight structure. He thought the course taken was most efficacious, and most likely to make the works water-tight. He observed that no unnecessary damage was done, and every arrangement was made for carrying on the works without injury to plaintiffs land.

Mr. MARTINEAU read affidavits of the plaintiff and others in reply, and denying the truth of the principal allegations in the answer, the plaintiffs alleging that from the evasive answers they received to their complaints, they lost all confidence in any representations made to them. They had no doubt whatever that the pipes were intended as part of a permanent structure; and they contended that notwithstanding their complaints the defendants had done a large amount of unnecessary damage to their land.

After another vain attempt on the part of the Vice-Chancellor to settle the matter,

Mr. JACKSON read the joint affidavit of Mr. Bateman and Mr. Hill, who declared that the new conduit complied with the provisions of the Water-Works Act, and expressed the opinion that concrete was better than puddling to prevent water from finding its way through the walls of the conduit.

WEDNESDAY, NOV. 8.

Mr. H. M. JACKSON continued to read the defendants affidavits, which included the statement of the mayor and town-clerk as to the nature of the work being done by the corporation, and tended to show that if any injury had been done to the plaintiffs by the abstraction of their water it had been done quite unintentionally, and could only be of a temporary character. The corporation and the Water-Works Committee, it was asserted, had acted in perfect good faith, and had not in any way exceeded the power and provision of the Water-Works Act of 1856.

The VICE-CHANCELLOR: I do not think I shall be satisfied in deciding the case unless Mr. Foster on the one side and Mr. Borrie on the other are produced. I am determined to get at the truth of the case, and I shall not be satisfied unless I hear the result of an inspection which took place within last week.

Mr. COTTON said he should ask to be heard on the legal points; he had an argument to lay before his honour on the question of law. He was not content to leave the case with simply calling witnesses.

The VICE-CHANCELLOR said he had been ever since noon on the previous day [and then it was noon on the second day] hearing affidavits on the facts of the case.

Mr. COTTON stated that even assuming that the water was spurting through, it would be no ground for granting the injunction.

The VICE-CHANCELLOR said he would hear all the evidence and all the argument; and then he would decide whether he would exercise the powers he had to send down some one to examine the present condition of the conduit.

The reading of the evidence was continued up to that of Mr. T. B. Foster, the engineer employed by the plaintiffs. Then

Mr. JACKSON applied for an adjournment for time to answer the evidence read. Or if that was not approved, he should ask for a third person to be sent down to inspect the works as they were now.

Mr. GLASSE said he was quite prepared to accept the appointment of a third person if the court approved; but the witnesses were in court who jointly examined the conduit on the 3rd of November, and there was no reason why the court should not be informed of the state of the conduit on that day.

The VICE-CHANCELLOR ultimately directed Mr. Foster to be put into the box.

Mr. *Foster*, in examination, said he had measured the water, and found that 195,000 gallons per day entered the conduit, and 105,000 gallons passed out at the lower hole, leaving a loss of about 88,000 gallons per day.

Mr. JACKSON declined to cross-examine the witness.

The VICE-CHANCELLOR called

Mr. *Borrie*, who said he had heard the affidavit of Mr. Foster, and was present in the conduit with Mr. Foster on the 3rd of November.

The VICE-CHANCELLOR: Is his a correct statement of the wall of the conduit when he inspected it?

Witness: He is correct as to the leakage existing, but not as to the quantity.

The VICE-CHANCELLOR: At what did you estimate the quantity of leakage?

Witness: 10,000 gallons per day.

The VICE-CHANCELLOR: That is instead of 105,000?

Witness: Yes.

The VICE-CHANCELLOR: Is there anything further in reference to which you wish to make a statement?

Witness: Yes, with respect to the works being completed. They are not completed, they are in an unfinished state.

The VICE-CHANCELLOR: When will they be completed?

Witness: When the water is taken from the back of the works, and that will take the whole of this winter.

The VICE-CHANCELLOR: Have you any other statement?

Witness: Yes. The work will be perfectly water-tight, and the water instead of coming into the conduit will flow to the plaintiffs brewery. If any leakage existed it would be from the conduit and in favour of plaintiffs brewery.

The VICE-CHANCELLOR: Then I understand you to admit that there is a leakage, but that it was from the incomplete state of the works, and that if time be given the work would be completed, and there would be no leakage whatever?

Witness: Yes; there would be none whatever.

Mr. COTTON declined to ask any questions of the witness.

Mr. *Charles Staveley Rook*, engineer of the Bradford Water-Works, was then called, and, in answer to the Vice-Chancellor, said he was in court when Mr. Foster's affidavit was read; had also read it himself beforehand, and he considered it a correct statement of what took place in the conduit.

The VICE-CHANCELLOR: You concur in all the facts therein stated?

Witness: Every one is the result of my own personal observation.

The VICE-CHANCELLOR: Do you agree with him as to the quantity of water flowing from plaintiffs land into the conduit?

Witness: Yes; I think 100,000 gallons is a correct estimate. I have examined Mr. Foster's calculations, and agree with them.

The VICE-CHANCELLOR: Are you of opinion, having in view the object to be attained—namely, the conducting to the town of Halifax the water which belongs to it—that the works are properly and scientifically constructed?

Witness: I do not think they are.

The VICE-CHANCELLOR: In what respect?

Witness: The side walls are not well built, and the joints, instead of being hard, are chiefly soft, and give way to the touch of the foot.

The VICE-CHANCELLOR: Will that account for the oozing out of the water?

Witness: Yes, it will.

The VICE-CHANCELLOR: You stated in your affidavit that you have seen instances of pot-pipes in walls.

Witness: Yes; but not in these walls.

The VICE-CHANCELLOR: Would that be a proper and scientific mode of constructing the work?

Witness: I think not.

Mr. COTTON declined to cross-examine.

The VICE-CHANCELLOR: As far as I am concerned, I do not require any further evidence.

Mr. JACKSON read the affidavit of James Paskin and George M'Millan, who said they had read the affidavits of Oates and Haslam, and, while they admitted that pot-pipes were inserted into the side wall, they denied that such pipes were inserted to withdraw the water from the adjoining lands, having been placed in the wall to prevent the water from running into the masonry work during its construction.

The VICE-CHANCELLOR: That is the whole of the evidence I require.

Mr. COTTON asked for an opportunity to produce more evidence, but

The VICE-CHANCELLOR declined to accede to his request.

Mr. MARTINEAU then proceeded to sum up the case on the part of the plaintiffs. He contended that the question was not one of a temporary character; but a claim had been set up by the corporation, which the plaintiffs were obliged to resist. It was undoubted that at the commencement of the disagreement the defendants claimed the right to insert pipes and get the water. He hoped the court would give such protection to the plaintiffs as would prevent their suffering any loss in the future.

THURSDAY, NOV 9.

Mr. COTTON addressed the court for the defendants. In the course of a long address, which occupied several hours, he reviewed the circumstances attending this quarrel, which the Vice-Chancellor over and over again stated would never have arisen if the ordinary courtesies of life had been practised by the litigants. He also observed that if the bill was dismissed with costs, he had no objection to any independent engineer being appointed, who would complete the conduit to his satisfaction.

The VICE-CHANCELLOR said his impression was that the defendants had failed in constructing such a work as they ought to have done. They had been far too long about it; and that had given some actual, or at all events apparent, justification to the fears which the plaintiffs had suffered. He could not understand why they had been so long over the work. They had been engaged ever since March trying to make this conduit water-tight, and had failed. The work

might have been done in two months if it had been carried on in a scientific manner. It was one of the most absurd things possible, and he could not conceive how they could spin out the time in the way they had. It was difficult to see who was most to blame; both were so much at fault, that he thought he should not be able to make them both suffer as they ought. They resisted every arrangement in such a way that he had come to the conclusion, if the case terminated, Halifax would be tranquil, which it appeared was not desirable.

Mr. COTTON went through the whole of the evidence at great length, and insisted that the issues raised had failed, and that the plaintiffs were not entitled to what they asked. The difficulty about the drainage was not raised, although it had been dragged in by the other side. No proof had been given of their allegation that the water belonging to plaintiffs had been fraudulently taken away; yet that was the nature of their statement, and it had not been shown that there was any necessity to ask for the interference of the court by way of injunction. He asked his honour not to pick out from the evidence facts which, in his view, would have entitled the plaintiffs to a decree. The plaintiffs came to the court upon one issue—an issue of fraudulent character—and it had failed.

Mr. HIGGINS followed on the same side. He characterized the whole case as showing a most determined purpose to file a bill and come into Chancery. By the strict and invariable rule of court, as fraud had been imputed and failed, the plaintiffs must pay the costs. The whole case they had to meet was the stealing of the water, and there could be no doubt that that had failed. Other little points had been raised which were not worthy of notice.

The VICE-CHANCELLOR (to Mr. Cotton): What if you stay all further proceedings in the cause except under the undertaking, and no costs on either side? Would you give an undertaking to complete the work in a proper manner?

Mr. COTTON assented, if so much of the bill was dismissed as related to fraud, without costs.

The VICE-CHANCELLOR: Dismiss so much of the bill as charges the defendants with fraud, and, by way of consent, without costs. Then the undertaking to stay all further proceedings in the cause, except under the undertaking.

Mr. COTTON: That would be for the sake of staying all proceedings between us, and for the sake of peace.

FRIDAY, NOV. 10.

When the cause was called this morning,

Mr. COTTON mentioned that the defendants had received notice from the plaintiffs solicitor to discontinue the work connected with the making of syphon communication to carry the plaintiffs water from the west to the east side of the conduit.

The VICE-CHANCELLOR observed that that was only another proof that the proper course was to appoint some third person to inspect the works and report what ought to be done.

Mr. GLASSE having replied,

The VICE-CHANCELLOR delivered judgment. After a lengthy review of the arguments and evidence, he said: I think the plaintiffs have sufficiently made out their case that the works are constructed either upon so erroneous a principle or in so defective a mode of execution that when completed they will not be those works which the plaintiffs are clearly entitled to, namely, works which shall conduct the water of the defendants through the plaintiffs land in such a way that their water shall not percolate into the drain, or be caught by the drain in any way, and so abstracted from their premises, and carried to the reservoirs of the defendants; that the plaintiffs have, in my opinion, not yet got, and that is what they are clearly entitled to have. Suppose I were to dismiss the bill in the present state of things, what would be the result? It is most unequivocably admitted by the learned counsel for the corporation, and also by the witnesses in most express terms, it being clear that the plaintiffs are entitled to a water-tight conduit through their land, that they have not got it, and if I dismiss this bill when will they get it? What security will they have? Are they to be at the mercy of the corporation? They have no right to enter into the conduit-pipe to see whether it is water-tight. If it had not been for the order which I made for the inspection on the 3rd of this month, that inspection would not have taken place, because I am perfectly satisfied that Mr. Borrie and those acting with him would not have given that access unless they had been obliged to do so by the order of the court. If, therefore, I dismiss this bill, what is the plaintiffs remedy? Are they to begin with another? I think I should entirely miscarry, having this matter brought before me, if I were not now to finally dispose of it, deciding as I do, upon the construction of the deed, that the corporation are bound still to construct a conduit-pipe through the plaintiffs land which shall be water-tight, which shall not allow any of the water flowing from their lands to get into the conduit-pipe, and they having entirely failed after all their efforts to put them in possession of such a work, I am of opinion that I must make some order which shall have the effect of securing to them what, in my opinion, they are entitled to, and which has not even been attempted to be denied by the corporation. That is in my opinion the title which they have established. I cannot in the slightest degree accede to the agreement that the corporation are to take the matter into their own hands, and that they are to have as much time as they like—months or years, for I do not see why their operations may not be extended over next year—and there will be a total want of remedy on the part of the plaintiffs to have that which, when this bill was filed, they were entitled to have, but which at present they have not had—the water-tight conduit to which I have referred. Therefore, upon these grounds, in my opinion, the plaintiffs have established their title to relief, and the order must be made in a form which will secure to them in a reasonable time a conduit completed in such a manner as to be water-tight. I am very glad indeed to find that the corporation are so deeply sensible that this is the proper course, that Mr. Cotton, in an early stage of this case, was instructed to say there never was any improper intention on the part of the corporation, although I think they have miscarried in the performance of their duty; and Mr. Cotton offered to give an undertaking, on the part of the corporation, that within a reasonable time, to be fixed by the court, it would finish these works in such a manner as to make them water-tight; and, indeed, I understood that that might be done under the direction of the court, and with that undertaking the whole litigation would have come to an end, except anything that might arise upon the undertaking; and except that which I designated in the beginning of my judgment as probably the most important question in this cause, namely, the question of costs. Upon the subject of the question of costs, I have felt, and still feel, very considerable difficulty in this case. I cannot say that the plaintiffs were altogether wrong in embarking in this litigation, although there might have been more efforts made to avoid it, and perhaps it was a pity they did not accede to the proposal made to them by the defendants for that purpose. But were the corporation right? They have set up some claim, not with the fraudulent intention attributed to them. They had made assertions with regard to their works which turn out to be unfounded. They omitted to make a reasonable proposal which they ought to have made at the commencement of this business—that the matter should be referred, and the result is that this unfortunate litigation has arisen. The plaintiff is entitled to the relief which I have already stated, namely, some protection that he shall have a perfectly water-tight drain through his estate, but under the circumstances of the case, I feel the greatest possible difficulty in coming to a conclusion, nor can I come to the conclusion that he is because he is successful to that extent entitled to all the costs of the suit. On the other hand, I feel great difficulty in saying that he is not entitled to anything. The corporation, so far as they are charged with fraud, and as far as the evidence of fraud is given, ought to be protected as to that part of the litigation. I am very desirous of deciding the main subject of dispute between these parties, and I therefore decide that the plaintiffs are entitled to an order upon the corporation, which will secure within a reasonable period the completion of the works in a proper and workmanlike manner, and in a water-tight condition. With regard to the costs, my present impression for the reasons I have already stated is, that there should be no costs on either side. On the other hand, on further consideration I may award to the plaintiff some moderate sum by way of costs. I therefore do not intend to decide finally that question now Hereafter I will say whether there shall be no costs throughout, or whether I will award to the plaintiff some moderate sum by way of costs. I am bound to come to the conclusion that both parties have been so much to blame that both deserve to suffer. The plaintiffs deserve to suffer for needlessly embarking in litigation about that which might have been settled, and would have been settled without litigation if they had been a little more forbearing. The defendants deserve to suffer, because they have up to a very late period resisted that which they were never entitled for one single instant to resist. I am aware that the defendants say that the evils were of a mere temporary nature, but they had been in existence too long when they said that, and they never made any offer which would give the plaintiffs the opportunity of seeing the conduit, and of judging whether the works were complete or not. They failed, in my opinion, in discharging their duty to the plaintiffs, and therefore thinking that they deserve to suffer, I cannot give them any costs, unless the dismissal of so much of the bill as charges fraud is insisted upon. If I were to do that, I may say, on looking at the passages containing the charges of fraud, considering that they are so few, it would be more expensive to hunt them out than the costs of it would be worth. Therefore I would suggest to Mr. Cotton that the better course would be that so much of the bill as charges fraud should be dismissed, with the consent of the corporation, without costs. I think as to the rest of the costs I will decide hereafter.

Mr. GLASSE: Your honour has expressed no opinion as to the excess, nor as to the drains.

The VICE-CHANCELLOR: As to the excess, I entirely agree in your argument that so far as they have exceeded the limits they are wrong. They are bound to keep within those limits. It is very true that in one view of the case they may bring an ejectment, or have an action of trespass; but if the corporation are only entitled to six feet, nothing can be more express than the deed is that they must keep within the limits. Therefore they must be restrained. Then the other point was as to the drains.

Mr. GLASSE: It is not only the drains at the sides, but the drain that passes over and under from the west side to the east.

The VICE-CHANCELLOR: I do not think that will be very important, because you are to have the works completed in a proper manner.

Mr. GLASSE: No; before this new conduit was made we had continuous drains connected with each other passing over from the west to the east of the conduit, some under and some over, according to the inclination of the ground. They have removed those in making the new conduit. They are bound under the Lands Clauses Act to reconnect them, and Mr. Bateman says that when that is done according to plan H. C. 2, he thinks the Water-Works Act will be complied with. They have not done that yet.

Mr. COTTON: The evidence is that every one of the other drains has been reconnected.

The VICE-CHANCELLOR: They were not connected when the bill was filed. If it appears that they have all been done since, it is of no use ordering them to do that which has already been done. There had better be liberty to apply. What time do you want to complete the works, Mr. Cotton? There must be a reasonable time for you to complete them; there must be the right of inspection on the part of the plaintiffs to see whether you have done all that you are bound to do, and liberty to apply.

Mr. COTTON: I do not know what the corporation will do, and, therefore, it is difficult for me, at the present moment, to say what is a reasonable time. The other side contend that the whole of this work must be reconstructed, but I do not believe they are correct in that. It is not the making by one continuous work a drain or conduit, but to stop it from time to time in order to prevent the water passing through it. Before I can say what time will be required for that purpose the corporation must have an opportunity of consulting their engineer to say what is a reasonable time.

The VICE-CHANCELLOR: I should recommend you both to agree to appoint some third person who has nothing whatever to do with the matter, under whose direction it shall be done, because, although the present gentlemen are both respectable (and I say in my judgment nothing against the respectability or the general competency of either of them), there is such a wide difference of opinion between them that there will be a continual assertion on the one side that the work is properly completed, and on the other that the work is not properly completed, and, therefore, the only way of getting through such trouble is to appoint some third person.

After a long conversation, the parties not being able amongst themselves to come to a decision, the Vice-Chancellor fixed six months as the period within which the works should be completed, and ordered the corporation to pay £300 towards the defendants costs.

On the following day the VICE-CHANCELLOR said: I wish to state that, in awarding the sum of £300 for costs, I meant that to be in case the taxed costs were more than that amount, because, considering the number of affidavits filed, and the engineers employed, I felt quite certain that the taxed costs would amount to £1000 at least. Perhaps it would be as well to put it in this way: I give the plaintiffs £300 costs, or the taxed costs, at the option of the defendants.

VICE-CHANCELLOR'S COURT—WEDNESDAY, NOV. 8.

(Before Vice-Chancellor BACON.)

WARD *v.* WOLVERHAMPTON WATER-WORKS COMPANY.

Mr. KAY, Q.C., and Mr. JOLIFFE appeared for the plaintiff in demurrer; Mr. FRY, Q.C., and Mr. PROCTER for the bill.

This was a bill filed by a shareholder in the Old Wolverhampton Water-Works Company against that company and its directors, to obtain a declaration that a right of purchasing certain property of the company, which had been given to the Corporation of Wolverhampton by a deed executed in 1857 was now determined. The old company was incorporated in 1845 by Act of Parliament, and under the powers of the Act they executed works, raised by the creation of shares, a capital of £44,980, and incurred a mortgage debt of £17,300. In 1855 the Wolverhampton New Water-Works Company were incorporated by Act of Parliament, and by the same Act the Corporation of Wolverhampton were empowered to purchase the works of the new company. By an agreement between the two companies dated the 14th of February, 1856, it was agreed that in the event of the arrangement being confirmed by Act of Parliament, the old company should grant its works in perpetuity to the new company at a rent which should be equal to interest upon the share capital of the old company at a certain rate; that the new company should pay the interest on the mortgage debt of the old company; and that the grant should contain a provision enabling the new company or the Corporation of Wolverhampton (in the event of a sale of the works of the new company to them), on or before the end of any year, by the payment by them to the old company of a sum equal to the share capital of the old company to entitle themselves to the works comprised in the grant subject to the mortgage debt of £17,300 and interest, but freed from the rent thereby reserved. The agreement was confirmed by an Act passed in 1856, and was carried into effect by a deed dated the 1st of January, 1857. The deed

contained a proviso that if the new company, or (in the event of a sale of the works of the new company to them) if the corporation should on or before any 25th day of December, after having given to the old company six months' notice of their desire to avail themselves of the option thereby given, pay to the old company £46,246, the new company, or the party making such payment, should thereupon become entitled to the works subject to the mortgage debt of £17,300 and interest, but free from the rent thereby reserved. In 1869 the Corporation of Wolverhampton purchased the works of the new company, and on the 18th of June, 1870, gave notice to the old company of their intention to pay £42,246 to them on the 25th of December, 1870, in order to become absolute owners of the works. The corporation, however, did not pay off the share capital at the time stated in the notice, but continued to pay interest; and on the 15th of June, 1871, they gave a second notice to the old company, stating their intention to pay off the share capital on the 25th of December, 1871. The plaintiff alleged that such purchase by the corporation would be to the prejudice of himself and the other shareholders of the old company, and filed a bill for the above purpose. The case was heard on demurrer.

The VICE-CHANCELLOR said that the case depended upon the construction of the deed of the 1st of January, 1857, which must be read together with the agreement and Act of Parliament which were carried into effect by it. It was clear on the construction of that deed that the right of the corporation to purchase the property was not taken away by their having given notice to purchase, and then having failed to purchase at the same time specified in the notice. Nor was it any hardship to the shareholders in the old company that such a right should continue to exist. The demurrer was, therefore, allowed with costs.

Miscellaneous News.

PROPOSED PURCHASE OF THE HEREFORD GAS-WORKS BY THE CORPORATION.

At a meeting of the Hereford Town Council just held, the special Gas Committee presented the following report :—

"Gentlemen,—Your committee beg to report that they have been in treaty with the Hereford Gas Company for the purchase of their property and plant. After much correspondence, an interview was arranged to take place, and did take place, between your committee and a committee appointed for the purpose by the gas company, and with your committee endeavoured to obtain some information which would enable it to report to the council what the position of the gas company with regard to the supply of gas in Hereford really is.

"All information as to the pecuniary position of the company, their dividends, receipts, and expenditures, was refused by them, and there was, therefore, no other course left to your committee to pursue but to employ the services of some person experienced in the sale and purchase of property of this description to advise them upon the matter. Your committee accordingly engaged Mr. Charles G. Cleminshaw, a gas engineer of very large experience, and he has been over the works of the company, and made a report upon them, and upon the general question of the desirability of purchase, and the method of ascertaining the amount of purchase-money. Mr. Cleminshaw's report is annexed to this report.

"Your committee, from the inquiries they have made, find that of late years the Legislature has very reluctantly placed the manufacture of so great a public necessity as gas in the hands of private individuals or companies, even when their dividends are limited, their accounts published, and the production a good quality of gas made binding.

"As the council have in contemplation an application to Parliament in the ensuing session for a local Act, we think it offers a desirable opportunity of inserting clauses, giving the corporation power to raise money for the erection of new works, and apply to the gas company the provisions of the Gas Clauses Consolidation Act. In the event of the purchase being concluded, it will, of course, be competent to withdraw these clauses from the Act; and as it will be ascertained before the local Act can come before a committee of either House, whether an amicable arrangement can be made with the gas company for purchase, there will be abundant opportunity for such withdrawal.

"Your committee are of opinion that it is very desirable in the interest of the City that the Town Council should become the purchasers of the existing gas works, and they beg to recommend that your committee should be authorised and instructed to enter into a contract with the gas company for the purchase of their property at a fair commercial value, to be ascertained by arbitration, and that it be left to your committee to arrange the terms of such contract and to carry out the proposed arbitration."

"C. ANTHONY, Chairman."

Mr. Cleminshaw's report, to the committee above referred to, was as under :—

"*To the Chairman and Members of the Committee of the Gas Corporation of the City of Hereford.*"

"Gentlemen,—In accordance with your request I have inspected the works of the Hereford Gas Light and Coke Company, for the purpose of advising you generally on the desirableness of purchase, and to enable me to give you some idea of their value. The manager has shown me all parts of the works, and has very fairly given me the information I asked for relating to their structural condition, but his written instructions from the gas directors, out of which I took the following extract, prevented me from going beyond this :—'It is understood that no books are to be inspected or accounts examined, or amounts of dividends or profits stated, but that the inspection shall be confined to what may appertain to structural condition and extent.'

"The works are in good condition, and have evidently been enlarged beyond the limit of the capital which the company are empowered by their Act to borrow; but it is impossible for me to form any opinion as to the sources from whence the money so expended has been obtained, or what amount has been expended in the reconstruction of old works, without a full examination of the company's books.

"These are points of so much importance in estimating, even approximating, the value of the works, that although, in order to meet your wishes, I have partly prepared a rough estimate, I do not think it advisable to complete it, or notice it further. I think it would be injurious to your interests to do so, for it is quite clear from the letters you have received from the gas company that they will not negociate on the basis of an approximate estimate; therefore, even if it could be more accurately made, it would not advance your position, whilst at the same time the want of accuracy might tend to deceive you.

"I have carefully read through the correspondence which has passed between yourselves and the gas company, for the purpose of advising you upon the proposals emanating from the gas company. They agree to sell by arbitration, but questions have arisen as to the manner in which it should be conducted.

"I think it would be advisable for the corporation to accept the offer made by the gas company, provided you can agree upon the mode of arbitration, so as to avoid unnecessary expenses. The Lands Clauses Act provides the legal method, and if you decide on the purchase it would, I think, be better to embody that in your agreement.—I am, gentlemen, &c.,

"Hereford, October 12th, 1871." C. G. CLEMINSHAW.

After a lengthy debate, a motion for the adoption of the report of the committee was carried by a majority 17 to 5.

BRIGHTON TOWN COUNCIL.

THE WATER SUPPLY.

A Special Meeting of the Brighton Town Council was held on the 17th inst., to consider a report sent in by the Works Committee on this question. The MAYOR (J. C. Burrows, Esq.) occupied the chair, and there was a full attendance of members.

This report briefly stated that the water company had expressed readiness to treat with the corporation for the sale of the undertaking by agreement, and the committee, therefore, recommended the council to authorize them to prepare the notices for purchase by agreement, instead of applying for compulsory power.

Councillor FRIEND having briefly moved the adoption of the report, as chairman of the committee,

Alderman HALLETT seconded, and said that being one of the deputation appointed by the Works Committee to confer with the water company directors, he would briefly state the result of that conference. It was simply as stated in the report—that the directors were willing to treat in a friendly way if the council withdrew the hostile character of the application to Parliament, but not otherwise, and the present meeting had, therefore, been called for that purpose. It was understood that all that was said by the deputation at this meeting was without prejudice to any course of action the council might think proper to adopt, and for what then passed he did not think there would be any insuperable difficulty in the way of making the transfer in a friendly way. It was the opinion of the town-clerk, acting on the advice of his parliamentary agents, that this course would be a very proper one, and preferable to arbitration, which might be unsatisfactory to either party, or to both. He (the speaker) and the committee generally believed that the directors—who, it should be remembered, were well known and highly respected fellow-townsmen—were acting in a perfectly straightforward manner in making this proposal, and had no intention whatever to put the council to any inconvenience or delay by making it. In fact, when certain terms were hinted at, the chairman replied that there was nothing in them to prevent an amicable arrangement.

Alderman MARTIN asked what would be the basis of the proposed negotiations.

The MAYOR said that all that was at present known was that the terms were to be mutually agreed on.

Councillor UNWIN asked what position the council would be in if the negotiations failed.

Alderman ALGER, in reply, said that there would simply be a delay of a year.

Alderman SMITHERS supported the resolution. He had had a conversation with a Sheffield gentleman, who said it cost that town £5000 to obtain compulsory powers, and it might perhaps cost Brighton as much if the application were opposed.

Councillor MARTIN said he thought it very possible that it might ultimately prove advisable to build new works, and have a separate source of supply, instead of purchasing the present company. The present proposal was a matter of half a million of money, indeed, £350,000 might——

The MAYOR, interrupting, exhorted Councillor Martin not to give utterance to sentiments which might prejudice their case. It was simply showing one's cards.

Councillor MARTIN replied that what he had intended to say was patent to all who could make a simple calculation. He had just had an opportunity of meeting his constituents.

Alderman BOWDIDGE: That is all you think of.

Councillor MARTIN said all he thought of was their interests and welfare, and he gave Alderman Bowdidge credit for doing the same. The first resolution on the subject passed by the council gave the committee power to deal with the question of an independent supply, and he intended to propose an amendment in the spirit of that former resolution, and also directing that compulsory powers should be applied for. He considered that an affair of such great importance and responsibility ought to have been in the hands of the General Purposes Committee, which, consisting of the present and ex-mayors, and the chairman of each committee, might be fairly considered as an embodiment of the collective wisdom of the council. This would therefore be included in the amendment.

Councillor NEWMAN seconded the amendment.

On the MAYOR stating that the question would ultimately pass into the hands of the General Purposes Committee, and Alderman BOWDIDGE remarking that it was too late to make any alteration at present, Councillor MARTIN withdrew that part of his amendment.

Councillor TAAFFE asked if the negotiations could not be continued if the application were made for compulsory powers; but Alderman HALLETT pointed out that if the council were hostile, the directors would be so too.

The MAYOR said that in that case both sides would be involved in unnecessary expense.

Councillor MAYALL asked whether it was really necessary to treat with the present water company at all. It would be much better to lose a year than to make a false step. He had made a careful investigation with Alderman Hallett, and though the scheme was not yet mature, he intended to bring forward the subject shortly, if arrangements were not made with the company, believing that if necessary a good supply of water might be obtained without interfering with them at all. He would, therefore, have the council assume an independent attitude, and while offering the water company everything that was fair, yet at the same time letting them know that they had another string to their bow, which would be used if equitable terms were refused.

Councillor WOOD was sure that the directors were an honourable body of men, and might be dealt with as such, but if they should be guilty of any trickery, Parliament would assuredly visit them with condign punishment, and they would receive the execrations of their fellow-townsmen. A year's delay in such a case might prove of considerable advantage.

Councillor DUDDELL asked what would be thought if, after all that had been said of the water company—the inefficient supply, the want of organization, &c.—the council should now go and treat with them, especially after the scheme shadowed forth by Councillor Mayall. As the undertaking could be purchased as cheaply by compulsion as in any other way, he was strongly in favour of Councillor Martin's amendment. Whatever the directors might be individually, of course they would be in duty bound to make the best bargain they could for their shareholders; therefore all that could be expected from them was, that they would exact the best terms they could. This might prevent the town getting a good supply of water for several years. What was wanted was absolute power to obtain everything that might be deemed desirable, the Warren Farm well, the Queen's Park, or anything else.

Alderman HALLETT pointed out that councillor Duddell was in error in supposing that any charge was brought against the water company except mismanagement. As to Councillor Martin's remarks about the General Purposes Committee, that gentleman had been in the council long enough to know that that committee was necessarily never in existence till all the committees had chosen their chairman, and this had only just been done. Would it be right or proper to throw over the friendly offer which the directors had made, especially when, as Councillor Wood had pointed out, their position would be much strengthened next year, if it was shown that, by acceding to the request of the directors, they had lost a year.

Councillor WOOLLETT agreed with Councillor Duddell's remark as to their having to deal with the directors, not individually but officially. A gentleman

of the press had just handed him a copy of a county paper, which contained an announcement of considerable importance, but which none of the Brighton papers had noticed. It was simply a notice that it was intended to apply to Parliament for powers to form a new water company to supply Brighton with water more efficiently. This ought to be a powerful argument in their negotiations with the present company.

This announcement appeared to create some surprise.

Alderman BRIGDEN doubted whether the directors had power to enter into negotiations without consulting their shareholders.

Councillor LUTLEY thought that a delay of a few months would be no harm.

This sentiment was subsequently repeated by Councillor REEVES. He was afraid they might be purchasing a worn-out concern.

Councillor SAVAGE thought it was possible the extension of Brighton might spoil the present source of supply.

The discussion was continued for some time, and various opinions expressed. Alderman Abbey showed scientifically that the Warren Farm well would be of no use; Councillor Unwin deprecated rivalry, but not delay; Councillor T. Hill was in favour of the amendment, and Councillor Pierson of the report, on the ground of expense; Councillor Davy said a certain majority of shareholders would be sufficient, but the question would ultimately have to go before them; Councillor Bright said that in that case directors always had sufficient proxies at command to ensure a majority; Councillor Bastick looked with suspicion on the stipulation of the directors as to the application for compulsory powers being withdrawn; Alderman Ireland said the committee, before sending in their report, had obtained advice from eminent men, as they were empowered to do; Alderman Alger said he never knew a committee hold so many meetings in so short a time as they had done, but more had already been said than ought to; Councillor Lamb said he had heard that there was plenty of water at Shoreham to supply Brighton—he deprecated hasty legislation, and hoped the corporation would soon obtain the gas supply also.

Councillor FRIEND, in reply, said that he had the greatest confidence that if the report were carried, the matter would be brought to a successful issue, and if any fresh scheme (of independent supply, &c.) should be preferred, the proceedings could be abandoned at any moment.

Councillor MARTIN here intimated that he was willing to withdraw his amendment, and the original resolution was carried unanimously.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE GAS SUPPLIED IN ST. MARYLEBONE, IN OCTOBER, 1871:—

October, 1871.	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quantity of Sulphur in 100 Cub. Ft.	Mean Quantity of Ammonia in 100 Cub. Ft.	Sulphuretted Hydrogen.
	*Mean of 24 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Company's gas . . .	16·97	17·74	16·33	27·47	11·25	33·21	0·83	None.
Chartered Company's common gas	16·49	16·81	15·76	40·87	18·70	33·70	1·16	None.
Chartered Company's cannel gas	23·21	24·07	22·58	36·41	16·87	26·40	1·17	None.

Mean of daily readings of barometer . . . . 29·79
" " " thermometer . . . 58·61

* Each observation consists of 10 readings of the photometer, at intervals of one minute.

During the month of October the mean illuminating power of the gas of the Imperial Company was equal to the light of 17 sperm candles, and ranged between 17·74 and 16·33 candles; seven times it exceeded 17 candles, and on no occasion did it fall below 16 candles. The mean amount of sulphur in 100 cubic feet was rather more than 33 grains, whilst the ammonia was less than one grain. The Chartered common gas gave a mean light equal to 16½ candles, and ranged between 16·81 and 15·76 candles; on four occasions only was it below the legal standard of 16 candles. The mean amount of sulphur in it was nearly 34 grains, and of ammonia a trifle more than one grain. The mean light of the cannel gas was equal to that of rather more than 23 candles, and ranged from 24·07 to 22·58 candles; the quantity of sulphur amounted to 26 grains, and of ammonia to rather over one grain. The pressure of all the gases was very good, and on no occasion did the usual tests detect the presence of sulphuretted hydrogen in either of them. The above results were obtained from the gas manufactured by the Imperial Company, at their Fulham works, and from the Chartered Company's gas manufactured at their works, Horseferry Road, Westminster.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE WATER SUPPLIED IN ST. MARYLEBONE, IN OCTOBER, 1871:—

October, 1871.	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by Incineration of Solid Matter in previous column.		Ammonia.
	Oct., 1870.	Oct., 1871.	Oct., 1870.	Oct., 1871.	
Distilled Water . . .	0°	0°	0°	0°	0°
West Middlesex water .	17·84	17·46	0·68	0·78	—
Grand Junction water. .	17·96	17·86	0·64	0·80	—

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000 grains) of water.

DR. STEVENSON'S REPORT ON THE ILLUMINATING POWER OF THE GAS SUPPLIED IN ST. PANCRAS, IN OCTOBER, 1871.—The gas supplied by the Imperial Gas Company to the parish of St. Pancras during October last had an average illuminating power of 14·5 standard sperm candles, the maximum being 15·5 candles, and the minimum 13·5 candles. The new Act prescribes a minimum of 14 candles. The testings are made according to the old Act; if they were made according to the directions of the referees under the new Act, these numbers would have to be increased about one-sixth. The gas, indeed, never fell below the requirements of the Act in force. Of impurities, ammonia was present on every occasion of examination except one; sulphuretted hydrogen was never present; sulphur in all its forms was present to the extent of 29·2 grains per 100 cubic feet. More sulphur was present than usual; in other respects the gas was of the ordinary quality. THOS. STEVENSON.

THE PURCHASE OF THE BIRSTAL GAS-WORKS.—Last week a public meeting of the ratepayers of Birstal, convened by the churchwardens and the chairman of the local board, in compliance with a numerously signed requisition, was held in the Lecture Hall, when an agreement made between the local board and the Birstal Gas Light Company, for the purchase, by the former, of the gas-works and plant, was read, and a resolution authorising the board to apply to Parliament for powers to complete such purchase was passed unanimously.

NEW GAS COMPANY.—The Ruthin Gas Company (Unlimited), with a proposed capital of £2500, in shares of £31 5s. was registered during the past week.

SALFORD—THE GAS PROFITS.—At the last meeting of the Salford Town Council, the general gas committee reported that the profits on gas for the year amounted to £3482, which was to be apportioned as follows:—Salford, £2030; Broughton, £628; Pendleton, £823.

GAS IN ROME.—On Sunday, Oct. 30, the new gas-works at Villa Cini, on the road to Ponte Molle, were inaugurated. On the previous day the Corso and Piazza di Spagna were lighted up, by way of experiment, at sunset, and the result was very brilliant.

"NO GAS."—The correspondent of the *Northern Ensign*, from whom we quoted in our last JOURNAL respecting "No Gas at Thurso," should in all fairness have stated that the gas failed owing to the dilapidated state of the works before Messrs. Stears and Co. undertook their enlargement and improvement. At the time the quotation appeared in our JOURNAL, Thurso was well and abundantly supplied with gas, and had been so for some time.

GREETLAND—THE GAS QUESTION.—At a meeting of the local board, held last week, the correspondence with the Elland Board, as to the gas-works, having been read and considered, a resolution was passed that this board was desirous of co-operating with the Elland Local Board with a view to the purchase of the Elland-cum-Greetland Gas-works, on terms mutually advantageous to both boards, and a committee was appointed to confer with the Elland Board on the subject. At a meeting of the shareholders of the gas company subsequently held at the gas-works, it was unanimously resolved that if in the opinion of the shareholders, a fair sum was offered by the local board for the gas-works, they would be willing to transfer the same to the board.

EAST LONDON WATER RATES.—A large meeting of the ratepayers of Mile-End Old Town was held last week, at the Vestry Hall, Bancroft Road, to take into consideration the notices issued by the East London Water Company with respect to the collection in advance of the rates for the supply of water, the peremptory mode in which payment was enforced, and the annoyance occasioned by the repeated warning to consumers to "repair fittings." Mr. Churchwarden Munro took the chair. The meeting was an enthusiastic one, and great complaints were made about notices which had been served to the ratepayers demanding the water-rates in advance. These demands, it was stated, were made by the collectors, with men at their back carrying pickaxes, and if not complied with the water supply was cut off. Messrs. W. Newton, J. Knight, A. Furness, Taylor, Potts, and A. Migotti addressed the meeting, and a resolution condemning the conduct of the East London Water Company, in attempting to enforce the payment of water-rates in advance, as most unjust and oppressive was passed, and the meeting pledged itself to resist the proceedings of the company to the utmost in their power. An influential committee was formed to carry out this resolution, and the proceedings terminated with a vote of thanks to the chairman.

THREE-LIFT GASHOLDERS AT MANCHESTER.—The corporation of Manchester have just completed the construction of two new gasholders at their station in Porland Street, Newtown. The new holders are an extension of the Gould Street works. They have three lifts. Some doubt has been expressed as to the prudence of having the extra lift, on the ground that the altitude and bulk of the holders would render them dangerous in the event of a severe storm. However, those concerned in their construction have every confidence in their stability. They were commenced about two years ago, and the total cost has been £35,450, inclusive of everything. They will hold 2,192,000 cubic feet of gas, and the cost of storeage is £16 per 1000 feet. The architects for the construction of the tanks were Messrs. Mangnall and Littlewood, of Manchester. Of the two tanks, the diameter of the large one is 155 feet, the diameter of the smaller one is 96 feet, and the depth of each is 32 feet below the surface. The contractors were—for the brickwork, Mr. James Rutherford, Manchester; for the masonry, Messrs. Ellis and Hinchliffe, Manchester; for the iron, Messrs. Walter Mabon and Co.; and the clerk of the works was Mr. Crowther. The works at Newtown and those in Gould Street contain now 4,442,000 cubic feet altogether, or 2,192,000 in the former, and 2,250,000 in the latter.

AN AMMONIA ENGINE.—An ammonia engine has for many years been a dream with enthusiastic inventors; and not altogether a dream, for, if we remember rightly, there was one invented by M. Tellier in the International Exhibition of 1862, which acted with great regularity, but was applied to no useful purpose. Subsequently it was stated in the French papers that an omnibus had been driven about the streets of Paris by means of ammonia. This is contradicted in a recent number of the *Scientific American*, which, however, informs us that a street car is actually propelled about New Orleans by means of ammonia. The engine of M. Tellier was a very simple affair. A vessel of ammoniacal gas compressed to a liquid replaced a steam-boiler. When a valve was opened ammoniacal gas rushed out and pressed against a piston within a cylinder filled with common air. The movement of the cylinder acted on a crank, and at the same time compressed the air before it in the cylinder. When the stroke was completed the ammonia vessel was closed, and a little water was injected into the cylinder behind the piston. The water instantly absorbed the ammoniacal gas, and the compressed air forced the piston back to its original position, opening at the same time the vessel of ammonia to drive it forwards again. By these alternate actions movement was given to a crank, and the force it was thought could be cheaply applied to useful purposes. No such application was made, however, until recently Dr. Lamm, of New Orleans, patented an ammonia engine, and employed it to propel a street car. This inventor has modified M. Tellier's engine so as to utilize the heat evolved when the ammonia is condensed, to generate expansive force in the disengaged gas. He employs, in fact, two cylinders—an inner one to contain the liquefied ammonia, and an outer one to receive and condense the gas that has acted on the piston, which outer vessel becomes slowly filled with a warm solution of ammonia, communicating its heat to the vessel of liquefied gas. An engine constructed on this principle propelled, we are told, a street car seven miles by an expenditure of little over a cubic foot of liquefied gas. The success of such an engine will chiefly depend on having every part of the apparatus perfectly air-tight, or a great loss of gas will ensue. The cost of liquefying the ammonia is said to be very small, the combustion of 3 lbs. of coal producing four gallons of liquefied gas. Thus the car may be said to have been propelled seven miles by the expenditure of about 6 lbs. of coal.

Register of New Patents.

2710.—JAMES BAIN, of Liverpool, in the co. of Lancaster, engineer, for "*Improvements in double-acting pumps.*" Provisional protection only obtained. Dated Oct. 14, 1870.

According to this invention two working barrels, the one larger in diameter or area than the other, are employed. These are placed in the same line. One hollow ram, formed with a blind end, is used for both barrels, the external surface of the ram working in contact with the internal surface of the large barrel, and the internal surface of such ram with the external surface of the smaller barrel.

2786.—Thomas Schoenberger Blair, of Pittsburg, Pennsylvania, U.S.A., but at present residing at Swansea, in the co. of Glamorgan, for "*Improvements in spiral pumps, and in apparatus employed in connexion therewith.*" Provisional protection only obtained. Dated Oct. 22, 1870.

This invention consists in so forming the rising main of the pump and regulating the entrance of fluid and air into the same that although it may be of considerable sectional area, yet the air shall, in passing up it, be caused usefully to expend the motive power due to its compression in assisting to raise the fluid passing up with it. This end is attained by various means. Thus, according to one method, the sectional area of the conduit is subdivided into a number of smaller conduits, each of about the maximum sectional area, that may be employed without causing the air to escape, as before stated; or, in place of one rising main of large sectional area, a number of small rising mains of small sectional area may be employed, all communicating at the lower end with the orifice of the spiral pump.

2826.—William Ross, of Glasgow, in the co. of Lanark, N.B., brassfounder, for "*Improvements in and relating to ball-valves and floats.*" Provisional protection only obtained. Dated Oct. 27, 1870.

These improved ball-valves are made of vulcanized rubber, in a hollow, spherical, or similar form, and are filled with compressed air, which gives a greater elasticity than when the ball is filled with an incompressible substance, and a greater firmness, combined with elasticity, than when it is filled with uncompressed air. The rubber ball has a metal nozzle fixed in it, with an inlet aperture for the compressed air, and which nozzle also serves for attaching it by to the rod or lever by which it is to be moved. The compressed air is admitted from a reservoir by a flexible branch pipe, and is imprisoned in the ball by the means of a plug of lead, or other soft metal or material, which is put into the inlet aperture, at first loosely, to let air go in past it, and is afterwards knocked or forced in through the flexible supply-pipe before withdrawing the ball from the pipe.

2832.—William Frost Sweetland, of Hendon, and John Merfield, of 216, Goswell Road, Islington, both in the co. of Middlesex, for "*Improvements in apparatus for purifying sewage.*" Provisional protection only obtained. Dated Oct. 27, 1870.

The improvements consist in employing tanks, each with a perforated false bottom or floor, on which a filtering-bed is laid. Over the filtering-bed is a tray with a bottom of woven fabric, or other reticulate material, and into this the sewage is run. The air is exhausted from beneath the false bottom, and then the pressure of the air on the surface of the sewage in the tray forces the liquid parts of the sewage through the open fabric, or material forming the bottom of the tray, and through the filtering-bed beneath into the lower part of the tank, from whence it is drawn or allowed to escape in its clear and purified state to any outfall. From time to time the tray, with the solid material remaining in it, is lifted out of the tank, and the solid material is removed for use as manure. When, after a time, the filtering-bed requires to be removed, the bottom or floor on which it is laid is similarly lifted out of the tank to be discharged, and for the filtering-bed to be relaid.

2838.—Joseph Judge Hayes, of Hertingforbury, in the co. of Hertford, for "*Improvements in treating and deodorizing sewage.*" Provisional protection only obtained. Dated Oct. 28, 1870.

This invention consists in treating sewage or other refuse with peat charcoal, and allowing it to repose for a time, after which it is filtered. The water passing off is again passed through a bed of peat charcoal, and afterwards through a filter or stratum of carbonate or hydrate of lime and sand, while the solid sewage is treated with mineral acid, to prevent the evolution of ammonia.

2857.—Thomas Schoenberger Blair, of Pittsburg, Pennsylvania, U.S.A., but at present residing at Swansea, in the co. of Glamorgan, for "*Improvements in spiral pumps.*" Provisional protection only obtained. Dated Oct. 31, 1870.

This invention consists in employing, in place of one single spiral or helical passage, as in pumps of present construction, two, three, or more such spiral passages, upon the same drum, which channels all communicate at the outlet end with the same delivery-pipe, but the inlet orifices of which are arranged at equal distances apart round the circumference of the drum carrying them.

2903.—Joseph Breeden, of the firm of J. and W. Breeden and Booth, of Birmingham, in the co. of Warwick, manufacturers, for "*Improvements in self-closing taps or valves.*" Provisional protection only obtained. Dated Nov. 3, 1870.

According to this invention the body of the tap consists of a circular chamber, closed by a cap screwed or otherwise fixed thereon. In the centre of the chamber the exit-pipe opens and the entrance-pipe opens into the annular space surrounding the central exit-pipe, which annular space may be covered with fine wire gauze. The top of the central exit-pipe constitutes a bed or seat on which a disc or diaphragm of leather or other flexible substance rests when the tap is closed, the diaphragm dividing the chamber horizontally. The disc or diaphragm is perforated at its centre, and a rod with a head at its top passes through the hole in the disc down the axis of the exit-pipe, its lower end protruding through a hole on the under-side of the body of the tap. The hole of the disc or diaphragm is somewhat larger than the rod which passes through it. A coiled spring between the covering cap of the body and the head of the rod presses the rod downwards.

2915.—John Somerville, of Dublin, gas engineer, for "*Improvements in pipes, and in the means of connecting them together.*" Patent dated Nov. 4, 1870.

This invention has for its object improvements in the joints of cast-iron and other mains and pipes for conveying fluids and liquids, and in the manner of making such joints so as to secure a perfectly tight and sound junction, the kind of pipes to which the first part of this invention is applicable being known as spigot-and-socket pipes; and for this purpose pipes are cast or made having a groove, hollow, or indent formed round the outside of the spigot, and a groove, hollow, or indent made or cast on the inside of the socket corresponding in position to the one in the spigot, so that when the spigot is thrust into the socket a narrow hollow chamber or circumferential recess is formed between them. In order to ensure the close contact of the spigot and socket at such parts of the same as may be considered desirable, and to produce the particular shape of the groove, hollow, or indent, the spigot may be turned, and the socket bored when found necessary. In the socket a "gate" or opening is formed communicating with the channel or recess between the pipes. When the spigot is inserted in the socket, melted lead or other suitable material is poured in through the gate until the whole of the recess is filled. Previous to running in the lead or metal, if metal is used for the filling, a piece of resin, tallow, pitch, or other suitable substance may be inserted in the gate to serve as a flux and assist the melted metal in insinuating itself into the crevices. A mandril, caulking iron, or other similar or suitable instrument is then driven into the gate so as to compress the lead or other material, and cause it to fill up any interstice not already filled. By these means a perfectly sound joint may be produced and maintained without the necessity of using yarn or the expenditure of time and labour in caulking, as is commonly practised.

The second part of this invention relates to joining pipes together by means of loose collars constructed upon the same principle as the socket before mentioned, the pipes being made with spigots as before described and the grooves, hollows, or indents so arranged that the melted lead or other suitable material run into the recesses formed by them shall by its contraction on cooling or setting tend to tighten the joint.

Although only one groove is spoken of as being made in each spigot and socket, several may be constructed if found more desirable. The form, too, of the groove, channel, or recess may be varied, but it is preferred to be more or less of a single or double wedge-shaped section. Also the material used to fill up the recess has been described as lead, but under some circumstances it may be found necessary to use an admixture of lead and antimony, or other suitable alloy. Portland or other suitable cement may also be employed for the same purpose.

2951.—William Robert Lake, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*Improvements in apparatus for effecting and regulating the supply of the deodorizing material in earth-closets.*" A communication. (Complete specification.) Nov. 9, 1870.

According to this invention the hopper is supported on an axis, so as to be susceptible of vibration to a limited degree by a depression of the seat, the arrangement being such that whenever the seat is occupied it will be alike depressed by the weight of the occupant and tilt the hopper slightly towards the front of the closet; and then, when the occupant rises, it will resume its normal position, and thus cause the hopper to go back to its original position; also the effect of such violence or rocking motion of the hopper being to facilitate the descent of the dry earth or its equivalent down the hopper to its point of delivery, which is from a horizontal rectangular box or chute that communicates with the hopper at the foot of the inclined back of the same.

2959.—Edward Primerose Howard Vaughan, of 54, Chancery Lane, in the co. of Middlesex, patent agent, for "*Improvements in the construction of and in the methods of working gas-engines.*" A communication. Patent dated Nov. 10, 1870.

This invention relates to working gas-engines in which the mixture of air and combustible gas is introduced into the cylinder between two pistons, one of which is loose, and the other connected to the main crank-shaft by means of a rod. In such engines it is difficult to retain the loose piston at the exact instant required. In order to obviate this difficulty, a flat iron rod or bar is connected to the loose piston. This rod passes between two iron plates which are covered with leather, and which, when required, press together, thus forming a sort of trap, and holding the flat rod in suspension. The trap is combined with a crank-lever movement, which latter is guided by an eccentric or cam fixed to the main axle of the driving-crank, for the purpose of holding the two plates apart and permitting the rod or bar to descend. Instead of using the flat slide-valve hitherto employed, a slide-valve having a circular section, and working to and fro in the same manner as a piston in a steam-cylinder, is used. The speed of the engine is regulated by the introduction of a greater or smaller quantity of combustible gas into the cylinder, and in order to make the regulation automatic, a piston is employed which is lifted by the aspiration of the air for the combustible mixture to a greater or less height. This piston is also connected with the gas inlet, and will regulate the inlet of the gas in such a way that when the machine works quickly the aspiration will also become rapid and lift the piston higher, and thereby close or partly close the gas inlet.

2965.—William Armand Gilbee, of 4, South Street, Finsbury, in the co. of Middlesex, patent agent, for "*An improved water-meter, parts of which are applicable for other purposes.*" A communication. Provisional protection only obtained. Dated Nov. 11, 1870.

This invention consists in constructing the meter with a chamber containing a moveable partition of india-rubber or other analogous material. The water raises and lowers alternately this partition, the oscillations of which being transmitted to the exterior by means of a rod are counted in the ordinary way. The reversal of the direction of movement of the water is effected by a spring distribution. A tube provided with two stoppers and supported by slides opens and closes alternately the inlet and outlet holes. When the water enters on one side it presses on the moveable partition which expels the water placed on the other side. The motion of the partition by means of oscillating levers contracts a spring which in distending suddenly when the partition arrives at the end of its stroke changes the position of the stopper tube, and thus changing the ingress or egress of the liquid inverts the direction of the movement of the water in the meter. The moveable partition then returns on itself, and so on successively.

2972.—Richard Potter Pearn and Frank Kelsey Pearn, both of Manchester, in the co. of Lancaster, for "*Improvements in machinery for raising and forcing fluids.*" Patent dated Nov. 12, 1870.

These improvements consist in the construction of a double-acting ram pump, the plunger of which works in a packing placed at about the centre of the length of the cylinder or pump-barrel. The cylinder or pump-barrel is made in two parts, containing the inlet and outlet passages to the valves; the two parts of the cylinder or pump-barrel are connected together by a fluid-tight packing. As the plunger is moved to and fro it draws in and discharges the fluid from each side through two sets of valves.

2974.—Augustus George Vernon Harcourt, of Christ Church, in the city of Oxford, for "*Improvements in the purification of gas.*" Provisional protection only obtained. Dated Nov 12, 1870.

This invention consists of two distinct and separate processes, either of which may be used singly or the two combined, each and both having for their object the more complete removal from the gas of impurities existing as sulphur compounds.

The first of these processes aims at converting the sulphur contained in coal gas (other than in the form of sulphuretted hydrogen) into sulphuretted hydrogen. For this purpose a mass of iron turnings, wire, or other suitable material is thrust into the mouthpiece of the retort after charging, the whole of the said mass being so compacted as to be easily removeable. In this position it acquires a temperature of low redness, which it communicates to the gas passing through it. By this means the bisulphide of carbon contained in the gas is decomposed, and its sulphur combines with hydrogen, forming sulphuretted hydrogen, which it is comparatively easy to remove. The same result may be obtained by conducting the gas, at any subsequent stage of its course between the retort and the purifiers, through a tube or system of tubes, or chamber of any form, heated by any convenient method to low redness, and partially filled with suitable heat-conducting and surface-presenting material.

The second process, if adopted in combination with the foregoing, would be used subsequently; and if used alone would be applied to the gas anterior to its passing through the ordinary purifiers, the object of this being the extraction of a part of the sulphur and ammonia more economically than by any method hitherto in use. With this view it is proposed to wash or scrub the gas with water in which oxide of iron is suspended contained in a vessel similar to a wet-lime purifier, in which the liquid is to be agitated and brought as effectually as possible into contact with the gas. As the oxide of iron would soon become inert, by reason of its conversion into sulphide of iron, it is necessary to revivify it. This may be done continuously by causing a stream of the liquid with the oxide suspended in it to flow from the purifier to be brought into contact with the air, and to flow back into the purifier. It is proposed to effect this circulation and aëration by pumping through suction and discharge pipes of considerable length, in the course of which chambers of larger diameter may be interpolated, the liquid with its suspended oxide, now partially converted into sulphide and atmospheric air. The discharge-pipe passes to the bottom of a tank, whence the liquid flows back to the purifier. Into this

tank runs also a small quantity of solution of persulphate of iron, which is decomposed by the ammonia extracted by the liquid from the gas, forming sulphate of ammonia and oxide of iron. This solution of persulphate of iron is one of the products of the following process, which is applied to portions of the liquid withdrawn at intervals from the purifier. The liquid is allowed to stand until it has separated into two layers, the upper consisting of a solution of sulphate of ammonia, the lower of a mixture of oxide of iron and sulphur. The upper layer is withdrawn and evaporated, yielding sulphate of ammonia. The lower layer is to be mixed with sulphuric acid, the mixture heated, and allowed to stand. The residue which remains undissolved consists of sulphur; the liquid is a solution of persulphate of iron.

In order to make the invention more complete, it is proposed to combine the purification process with that of converting the ammoniacal liquor into sulphate of ammonia by blowing air first through the heated ammoniacal liquor, thence through the purifying liquid, and thence into a scrubber, where the ammonia which has not been taken up by the purifying liquid may be fixed by dilute sulphuric acid. By these means a continuous round of purification and revivification is kept up, and although it may be necessary to pass the gas through a second purifier of the same description, or subsequently through a dry oxide purifier, or a lime purifier, or both in addition, so ready and effectual a means is afforded for removing sulphuretted hydrogen and ammonia from gas, and converting these substances into a form in which they are commercially valuable, as to constitute a great improvement upon the processes now in use.

It will be observed that no particular form of apparatus is relied upon in either of the processes before described for effecting the object in view, but any convenient form may be adopted.

2991.—JOHN BRUNTON, of Great George Street, in the city of Westminster, civil engineer, for "*Improvements in meters for water or other fluids.*" Provisional protection only obtained. Dated Nov. 15, 1870.

This invention consists in the employment of an Archimedian measuring-screw, fitted in a cylinder or chamber of known capacity, in combination with a second Archimedian screw and self-acting stop-valve, capable of a separate and independent action, so that, should the measuring-screw cease to revolve from any cause, and consequently cease to drive the registering or counting mechanism, the supply of water or other fluid will be cut off, thus preventing fraud. The measuring-screw may consist of one or more turns, and is placed with its spindle or axis vertically inside a drawn metal tube of known capacity, which it fits accurately, but without being in actual contact with the sides of the tube. This tube forms a lining to, or in itself may form, that portion of the supply-pipe which contains the measuring and stop-valve screws. The lower end of the measuring-screw spindle turns upon a conical pivot, and carries a small pinion, which gears into a large spur-wheel contained in a fluid-tight lining or case attached to the side of the supply-pipe, the axis of the spur-wheel driving the usual or other counting mechanism.

3060.—WILLIAM RICHARD POOK, of 9, Vaughan Parade, Torquay, in the co. of Devon, for "*Improvements in ventilating sewers by apparatus adapted for that purpose.*" Provisional protection only obtained. Dated Nov. 23, 1870.

These improvements consist in fitting on the top of a square frame a grate, the frame having a wire basket containing charcoal inside thereof. Over the basket is an iron bucket for receiving the refuse. There is a tube in the centre of the basket, with a balanced valve at the end, for carrying off the overflow water from the bucket. Between the charcoal basket and the frame, also between the bucket and the frame, is an annular space for the air to pass on its way from the sewer through the charcoal basket.

3062.—WILLIAM ROBERT LAKE, of Southampton Buildings, London, consulting engineer, for "*Improvements in gas-regulating apparatus.*" A communication. Patent dated Nov. 23, 1870.

This invention is an improvement upon gas apparatus of the class shown in Patent No. 1335, May 10, 1870.

The object of this invention is to regulate the escaping jet of gasoline vapour in proportion to the quantity that is being consumed in one or more burners, and to entirely close the orifice at the extreme upward or downward movement of a diaphragm when the burners are shut off, or when the vapour-generator ceases to operate, thereby ensuring great safety, and adapting the apparatus to any number of lights within the capacity of the parts.

From the vapour-generating retort, as in the aforesaid patent, or any suitable apparatus, the gasoline or hydrocarbon vapour is led to one end of a tube, within which is a stem, with a valve at each end, that is fitted so that it can be moved endwise, and at the other end is a nozzle for the vapours to issue through a tube, into which air is admitted in the proper regulated proportion, and the air and vapours pass into a holder made with a diaphragm or rising and falling case, and this is connected by a lever and rock-shaft or arm with the aforesaid moving valve-stem; hence, as the diaphragm rises from excess of vapours, the conical valve at the end of the stem within the jet-tube lessens the jet orifice, or entirely closes the same; and, on the other hand, if the diaphragm falls the jet will be increased in volume by the withdrawal of that conical valve, therefore the supply of gasoline vapours will be in proportion to the quantity consumed. If the retort ceases to supply the gasoline vapour, or through accident the diaphragm falls below its given point, the valve at the back end of the said stem acts to close the inlet orifice entirely, thus rendering the apparatus safe under all circumstances.

3071.—CHARLES MENDEL JOSEPH, of Grosvenor House, South Place, Kennington Park, in the co. of Surrey, for "*Improvements in filters.*" A communication. Provisional protection only obtained. Dated Nov. 24, 1870.

In carrying out these improvements, it is proposed to place within a cylinder a frame covered with any fibrous material, the ends being tied to the heads of the frame. A pipe passes into the frame to conduct the liquid into it.

3079.—WILLIAM NUNN, of Oak Lodge, Bushey Hill, Peckham Road, in the co. of Surrey, for "*Improvements in traps to drains and other places.*" Patent dated Nov. 24, 1870.

This invention consists in employing a valve capable of closing the passage through the trap in the absence of liquid, and of being raised to admit of the passage of liquid on liquid flowing therein. This is effected by a floating ball or other valve, or by an inverted cup covering the outlet passage, through the trap being formed to float in the reservoir of the trap when liquid runs into that reservoir, to pass through the trap, or in the absence of such liquid the float will descend, and by indiarubber or other packing, if need be, close the opening and seal the passage. A moveable lining may be applied to the top to facilitate cleansing.

3081.—JOHN PENN, jun., of the Steam-Engine Works, Greenwich, in the co. of Kent, engineer, and WILLIAM HOUNSELL, also of the above-named works, coppersmith, for "*Improvements in the manufacture of curved metal pipes.*" Patent dated Nov. 24, 1870.

In carrying out this invention it is proposed to employ three rollers—namely, a pair of rollers, one curved on the face, and the other concave, corresponding in curvature with the sectional form of the half pipe to be produced. The position of one or both of these rollers is adjustable by means of their bearings being traversed in slots. The third roller is behind this pair, and is so set that when a strip of metal to form a half-bent pipe is passed between the rollers of the pair, it comes against the third roller, and so the trough which the pair of rollers produces is bent to a regular curve, the radius of which depends on the position of the third roller in relation to the rollers of the pair, and this position is adjustable, the bearings of the third roller being capable of being traversed in slots in the frame. The third roller is always on the outside of the curve of the piece which it is forming, and is convex or concave on the face according as the convex or concave side of the half pipe is to be on the outside of the curve or bend, for it will be understood that two pieces, one of each sort, are required to fit together and form a bent pipe. The other rollers can also be changed, to adapt the machine to make curved pipes of different diameters. The pair of wheels are driven by screws and worm-wheels, or by other powerful driving gear. The edges of the metal strips are made true and parallel before they are brought to the machine, and edge guides are provided to prevent the strip twisting while it is being bent, or the end or ends of the strip may be held and controlled by nippers or other instruments during the blending operation. Two half pipes similarly curved being thus prepared, their edges are bevelled and notched together and then brazed. The curves may be made in continuation of straight lengths in the same piece of metal. Additional rollers may be employed to aid in controlling the metal.

3086.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in earth-closets.*" (Complete specification.) A communication. Patent dated Nov. 24, 1870.

According to this invention the frame of the commode has hinged to it a box or receptacle which serves as a seat-cover, and contains the earth needed to cover the fœcal matter in the pan. In this box there is formed a hopper, the lower part of which is at the front of the box, and the bottom of which slopes upwards towards the rear of the box, the sides of the hopper also converging to the same point. Here also is situate the upper end of a tube or conduit which extends down through the cover so as to open into the seat when the cover is down. When the cover is thrown back the earth will gather in what was formerly the highest, but is now the lowest part of the hopper, and will be immediately over the mouth of the tube, there being space enough between the tube and the top of the box to allow a considerable quantity of earth to fall between them. When the cover is returned to its position over the seat, the major part of the earth will return to the bottom of the hopper, but a quantity of it will pass through the tube and will thence be discharged through the seat into the pan which contains the excreta.

3107.—AMOS BRYANT, of Heavitree Road, Exeter, and SAMUEL HALL CULLEY, of St. Sidwell's Cottage, in the city of Exeter, both in the co. of Devon, for "*Improvements in deodorizing and treating sewage, and in apparatus to be employed for this purpose.*" Patent dated Nov. 26, 1870.

By this invention it is proposed to cause the sewage to pass into catch-pits or settling-beds, to separate the greater part of the solids from it, having previously added deodorizing materials, such, for example, as carbolic acid. The sewage flowing off from the catch-pits or settling-beds is caused to filter through sawdust—or it might be through filters of sawdust, which by preference is charged—and other materials, until the effluent waters are purified to the extent desired. The sawdust after being so used as a filtering material is allowed to dry, and is subsequently mixed with the sediment collected in the catch-pits or settling-beds. The sediment is allowed to drain, or is partially dried, by spreading it out in thin layers on drying-floors. A layer of the dry or charred sawdust is spread out on to a suitable floor, and the sediment from the catch-pits or settling-beds is thrown over it, and then another layer of sawdust is thrown over the sediment. The whole is mixed together by means of shovels, and by reason of the drying nature of the sawdust the mass quickly dries and is readily pulverized. Afterwards the dried material is sifted to separate all lumps from it, and these lumps are again still further dried, reduced to a powder, and sifted. Sulphuric acid or other chemicals may be added before the material is finally dried and sifted.

3159.—HENRY DOULTON, of High Street Lambeth, in the co. of Surrey, for "*Improvements in the construction of irrigation conduits or channels for the conveyance and distribution of sewage and other waters.*" Patent dated Dec. 1, 1870.

In these improvements the bottom or invert of the conduit is divided longitudinally. The upper parts of the conduit are formed of angular tiles made with longitudinal passages through them to lighten and to cause them to burn better. These angular tiles also are first made as pipes, which are partly divided before burning, and the separation is completed afterwards. One face of each angular tile forms the coping, and the other the side or wall of the conduit or channel. The invert and sides may be laid on concrete, or, where the soil admits, they may simply be laid in a suitable trench with supporting bricks on either side to sustain the coping.

3162.—JOHN JOSEPH PARKES, of 17, London Street, Paddington, in the co. of Middlesex, gas engineer, for "*Improvements in gas-stoves or apparatus for cooking and heating purposes.*" Patent dated Dec. 2, 1870.

These improvements comprehend the construction of gas-stoves in the following way:—A stove is made that is adapted not only for warming a room or apartment, but also for effecting certain cookery operations, such as baking, stewing, and boiling, similarly to ordinary gas-stoves. It consists of a proper exterior case of iron or other suitable material, but in this stove, in the lower part thereof, gas-burners are placed, which are covered with a cage of wire gauze or other suitable open-work, and higher up in the stove an oven is provided, which projects from the stove, and has heat-spaces which are open at the bottom part of the oven to admit the heat from the burning gas, such heat-spaces being situate between the outer and an inner case which forms the oven proper; so that, although the oven is heated by the heat from the burning gas from the burners, the viands to be baked are shut off from contact with the gases or vapours proceeding from the burning gas in the non-projecting part of the stove. Above the oven is a chamber or space into which a boiler, stewpan, or vessel can be fitted, a top, cap, or cover being provided in order that such boiler or stewpan may be shut in or open at top, as may be desired; and the upper part of the stove is so arranged that the heat has to pass around the boiler or stewpan, and the waste heat then passes up a chimney. As the oven projects beyond the front of the stove, there is in the interior of the stove a space at the back of the oven opening direct to the upper part of the stove where the boiler or stewpan can be placed as above mentioned, so that the heat can ascend to the boiler or stewpan and heat the same; but when it is desired to concentrate heat upon the oven, this space can be wholly or partially closed. If thought desirable, other gas-stove appliances might be used with this stove, and a twisted pipe for heating liquid can be used; and the form of the stove might be such that the oven should not project, but be flush with the outer surface, and charcoal or other heat-producing medium may be substituted for the herein described heat-supply arrangements, if deemed desirable.

3167.—FRITZ HILLE, of Flora Villa, Brentford, in the co. of Middlesex, for "*Improvements in the manufacture of deodorizing and disinfecting compounds, and in the treatment of sewage and impure waters, and in closets and apparatus for the treatment of sewage.*" Patent dated Dec. 2, 1870.

This invention consists in an arrangement of settling-tanks, each communicating with a sewer or channel, by which the sludge settling in it may be carried off into a sludge-well, so that the settling-tanks can readily and quickly be cleaned; also the employment of carbonic acid gas in the purification of sewage. The disinfecting compound used is lime, in combination with chloride of zinc, or chloride of calcium, or salts of magnesia. This compound is made either in a liquid form or as a dry compound in casks or cakes.

3169.—HENRY YOUNG DARRACOTT SCOTT, of Ealing, in the co. of Middlesex, lieutenant-colonel Royal Engineers, for "*Improvements in the treatment of sewage, and the preparation of materials to be used for its purification.*" Dec. 2, 1870.

In lieu of placing the precipitating and filtering beds in close proximity to each other, or combining them in one establishment, the precipitating chemicals are introduced in the sewers at points far removed from the filtering-beds, at the various manholes, or at points specially arranged for the purpose throughout the entire system of sewers. At the outfall of the sewers the depositing-tanks and filtering-beds are employed to arrest the solid fuel and other matters which the chemicals have thrown down. At intervals along the line of sewers, shafts or towers are constructed in which proper arrangements are made for collecting ammonia in any of the well-known manners. In order to regulate the addition of the chemical agents at the various manholes or other stations, hoppers or vessels are provided fitted with mechanical arrangements for yielding to the sewage water a continuous supply of disinfecting chemical compounds. This supply may be made to vary in amount with the hour of the day, and the consequently increasing or decreasing quantity of sewage requiring to be treated.

3179.—JOHN ROBB, of 19, Clark Street, Stepney, in the co. of Middlesex, for "*Improvements in four-way valve apparatus.*" Patent dated Dec. 3, 1870.

According to these improvements there are two valves to the four ways. Each valve moves on a hinge joint, and is packed on its opposite sides, so that each side may fit to a seat provided for it. The valves are capable of simultaneous movement by being connected through links, or other suitable connecting means, to arms, from an axis which passes through a stuffing-box, and is worked by an arm thereon, carrying a segment of teeth taking into a worm or screw, or by other suitable means. By these means facility is afforded for direct passage through each valve in either direction to the respective ways.

The surfaces of the valves are packed with wood, or other suitable material, according to the purpose to which the valve apparatus is to be applied, and such apparatus is particularly applicable as a bye-pass valve at gas-works and other places.

3228.—WILLIAM LLOYD WISE, of Chandos Chambers, Adelphi, in the City of Westminster, patent agent, for "*Improvements in the mode of and apparatus for igniting gas.*" A communication. Patent dated Dec. 8, 1870.

According to this invention, a platinum wire, inserted between the poles of a very small galvanic pair of zinc and graphite, without showing the slightest emission of light in the dark, ignited a jet of gas almost instantaneously. It is evident in this case, the red heat of the wire being only an effect of catalytic action, that the galvanic circle is acting in a very different manner from those former methods in which ignition has been effected by the direct action of the electric spark. This circumstance, and the hydraulic closing of the galvanic circle, are the principal characteristics of the proposed new contrivances, whose practical value has been tested by numerous experiments; for, if a stronger action of the galvanic current were required, the power of the battery would be exhausted in a far shorter time; and, indeed, it would be impossible to employ an apparatus of small interior resistance (such as zinc and graphite, with a solution of bichromate of potassa and sulphuric acid, or chloride of silver and zinc, with a solution of salt) for months without renewing the filling. At the same time, the hydraulic method of completing and breaking the galvanic circle affords the easiest and simplest means of instantly producing the desired catalytic action, and afterwards stopping it again at will, for the sake of economizing the materials.

3269.—FREDERICK LUDEWIG HAHN-DANCHELL, of Horwich, in the co. of Lancaster, engineer, for "*Improvements in apparatus for treating sewage matter, and for filtering sewage and other water.*" Patent dated Dec. 14, 1870.

According to this invention, filters containing charcoal are arranged on different levels in chambers. Between the chambers are side cisterns, the bottom of which are tapered. These cisterns are fitted valves, which are opened and closed when required by hand wheels and screws. The upper portions of the first series of filters by the pipes and the tops of the second series by other pipes, and so on to the last series, which are connected by pipes, and which are in communication with the weir or other outlet.

3304.—SYDNEY SMITH, of Hyson Green Brass Works, near Nottingham, brass-founder, for "*Improvements in cocks and valves.*" Patent dated Dec. 17, 1870.

This invention consists in the employment of a loose metal disc whose face can be closed against a seating to prevent the passage of fluid through the cock, or be brought out of position and leave the passage-way clear. On the back of the disc is a stud which is received in a slot on a flat taper wedge, the base of which is connected to the spindle. The spindle screws into a cover, and has a hand-wheel fixed upon the outside.

3315.—ROBERT RUSSELL, of Liverpool, in the co. of Lancaster, for "*Improvements in filters and the fittings connected therewith.*" Patent dated Dec. 19, 1870.

The filter consists of a metal cylinder, to the top of which the inventor solders a hollow cap, the crown of which is tapped so as to screw on to a collar of a nozzle of an ordinary water-tap. A vertical tube or pipe extends downwards from the under side of the cover to the bottom of the cylinder, where it opens out into a small chamber formed by an inverted dome-shaped cup which is used to close the bottom of the cylinder, and which in the centre is fitted with a draw-off cock. The lower cap with its draw-off or flushing tap is connected by a screwed collar, so that it may be readily removed and replaced for withdrawing and renewing the filtering media.

3323.—JOHN REID, engineer and manager of the Edinburgh and Leith Gaslight Company, of Leith, in the co. of Mid Lothian, N.B., for "*An improved liquid-meter.*" Patent dated Dec. 20, 1870.

This invention relates to an improved liquid-meter, which, from the simplicity of its construction and action, is at once economical in cost, and not liable to get out of order, whilst it measures in a positive and accurate manner. The measuring-chamber of the meter is in the form of a cylindrical segment, the end of which is rather larger than the half of a circle, and it may be of any convenient length axially, or at right angles to the plane of such segment. The usual counting-wheels and indexes are provided, and are acted upon by a spindle which passes through a stuffing-box, and is concentric with the segment circle. The measuring-chamber contains a piston of a rectangular form, which is connected to the spindle either by passing through a slot in an enlargement formed on the part of it inside the chamber, or by being itself formed with a slot through which a flattened part of the spindle passes. The piston is of a thickness equal to twice the excess of the segment beyond the half circle, and its sides radially exceeds the radius of the segment circle by a certain amount. One edge of the piston works in contact, or nearly so, with the outer circular or cylindrical side of the chamber, whilst the other edge works in contact, or nearly so, with a circular or cylindrical concentric cavity, of small radius, formed in what may be termed the chord side of the chamber. The chamber is placed with this chord side in a vertical or somewhat inclined position, and the inlet for the liquid is formed in it below its central cavity, whilst the outlet is above that cavity. If the piston is at right angles to the chord side, the liquid entering under it lifts it up and turns it until it becomes parallel with the chord side. The piston having reached this position next slides by gravitation down the chord side, its then lowest part covering the inlet as its upper part uncovers the outlet from the chamber. Then the edge of the piston which was previously in contact with the small cavity in the chord side comes into contact with the outer cylindrical surface, and *vice versâ*, the piston changing its axis from near one edge to near the other, crossing through or on the spindle, and being guided thereby; the liquid continuing to enter causes the piston to turn on its new axis until half a revolution is performed, which brings it against the chord side, when it again slides down, and changing its axis and contacts proceeds to perform another half revolution, and so on, the motion consisting of a series of semi-revolutions separated by the sliding down of the piston after each. The motions of the piston resemble those which take place on turning a card over on one edge on a table, sliding back the card to its starting position, turning it again in the same direction as before, and again sliding it back, and so on repeatedly.

3333.—WILLIAM FIRTH, of Leeds, in the co. of York, for "*Improvements in dressing cannel coal and other minerals, and in apparatus employed for that purpose.*" Patent dated Dec. 21, 1870.

This invention has for its object improvements in dressing cannel coal and other minerals, and in apparatus employed for that purpose. It has hitherto been the practice in dressing cannel coal to detach the "hub" or "shale," or other objectionable matter, from the pure coal by hand labour, the dresser using a small pick or tool suitable for the purpose; but that process is very uncertain in its results, and much deleterious matter is often left adhering to the pure coal, which is injurious to the gas and coke produced therefrom; besides this, the waste of good coal is often very serious, and the cost of dressing is heavy. These improvements have in view the substitution of mechanical arrangements instead of manual labour. The block of cannel coal as it is hewn is placed on a table, over which a separating tool (or it might be tools) is mounted. The joint between the strata which it is desired to separate is brought beneath the tool, which is then forced down by steam, air, or water acting in a cylinder, or by other sufficiently powerful means, and so the separation is effected at the line of cleavage. The tool or tools may if preferred be arranged to work horizontally. In some cases a moving table may be used with endless chains or other suitable contrivance to carry the separated matter from the dressing-table to the waggons used for its removal. It is also proposed to apply this invention to the dressing of iron ore and other minerals which require cleansing before being used.

3347.—HENRY BONNETT, of Swansea, in the co. of Glamorgan, plumber, for "*Improvements in water-closets.*" Provisional protection only obtained. Dated Dec. 21, 1870.

According to this invention, the outlet of the basin at the back or side has a valve secured in a vertical position, the valve is contained within a suitable receiver which is connected at its base to a trap leading to the soil pipe.

3387.—JOHN WOLSTENHOLME, of Radcliffe Bridge, in the co. of Lancaster, engineer, and EDWARD HOLT, of the same place, machinist, for "*Improvements in steam-pumping engines.*" Provisional protection only obtained. Dated Dec. 29, 1870.

In carrying out this invention, it is proposed to make the valve-box of a cylindical form internally, to receive the valves which are made of corresponding form. A passage is made at each end of the steam cylinder, so that on the piston approaching either end of the cylinder, it will pass beyond the port through which the steam is acting. A portion of the propelling steam flows through a passage into the valve-box, at such a point that the steam shall act upon one of the piston-valves, and move it into a position suitable to cause the direction of motion of the main piston to be reversed.

35.—JOHN LUPTON BOLDING and JOHN THOMAS BOLDING, both of 19, South Molton Street, Oxford Street, and JOSEPH TITSINK, of 28A, York Street, Baker Street, both in the co. of Middlesex, for "*Improvements in water-closets, and in valves and regulating apparatus for the same and for other purposes.*" Provisional protection only obtained. Patent dated Jan. 6, 1871.

This invention consists of an arrangement of apparatus for opening and closing the valve at the bottom of the pan. Also arrangements of apparatus for regulating the supply of water to the pan each time that the handle is pulled up. Also an equilibrium valve ball-cock for regulating the supply of water to water-closet and other cisterns.

53.—THOMAS GOODE MESSENGER, of Loughborough, in the co. of Leicester, hydraulic engineer, valve manufacturer, and horticultural builder, for "*Improvements in the coupling of pipes.*" Provisional protection only obtained. Patent dated Jan. 10, 1871.

In carrying out this invention, there is formed at one or both ends of each length of pipe a flange (or a ring), having one or more lugs, ears, or tabs, and holes or slots. Or, instead of a flange, the socket is formed with tabs or ears. The socket may have two different internal diameters. The outer end of the socket is made of somewhat larger diameter, to receive a ring, coil, collar, washer, or packing to encircle the pipe inserted in the socket.

88.—ROBERT MILLS, of Greenock, in the co. of Renfrew, N.B., ship smith, for "*Improvements in ship and other pumps.*" Provisional protection only obtained. Patent dated Jan. 13, 1871.

This invention consists of an arrangement of the essential working parts of a double-acting pump, suitable by slight modifications for ship pumps, and lifting and forcing pumps generally, and for fire-engines; and the novelty of the improvements and arrangement substantially consists in having and forming the main working barrel in the centre, between two suction and discharge chambers, cast parallel in one piece, with the barrel on each side. The whole three chambers being closed in by ends and flanges, on which are bolted or formed across the suction chamber or well, at one end opening right straight into the main suction or lifting pipe, which is fitted with a "bilge" branch and pipe, controlled by regulating valves or cocks when used for ships, and at the other end by a discharge chamber, either open or close as desired for level discharge or forcing, in which latter case, or for fire engines, an air vessel would be fitted to the discharge vessel. The rod of the plunger (which is solid and packed or formed with double-capped leathers) works fluid tight out through the one end, and is actuated by a connecting rod and crank on a crank fly-wheel shaft, either worked with winch handles and manual power, or by steam power as desired. Neither the piston nor working barrel have valves in them, the close ends of the barrels open simply by ports into their respective suction and discharge side chambers, both of which are fitted with their suction and discharge ports and valves of the flat kind in their ends or flanges, exactly over each other, so as to open from and into the well end, and the discharge cross chambers, and be convenient for inspection and repair respectively.

90.—SAMUEL BROTHERS DARWIN, of Shrewsbury, in the co. of Shropshire, for "*Improvements in apparatus used in the manufacture of gas.*" Patent dated Jan. 13, 1871.

The object of this invention is to relieve the retorts from pressure during the process of distillation, and consists in the construction and use of the following apparatus. The ascension-pipe in this case, instead of dipping into the hydraulic main by means of a hand or H pipe, is inserted through the bottom thereof, and is furnished with a cap or cover suspended over it, but which rests on the top of it, and dips into the liquid contained in the hydraulic main when the apparatus is not in action, thus forming a seal. But when the apparatus is in action, the cap or cover rises with the pressure of the gas, and allows the gas to pass off freely through the hydraulic to the condenser or other apparatus. The cap or cover is hung by a rod passing through an aperture in the hydraulic main, and is attached to a chain which travels over a pulley, and terminates in a counterbalance. In order to admit of the rod moving freely, and preventing the escape of gas, a lute or seal is provided for that purpose. Pipes are attached at or near each end of the hydraulic, for supplying it with liquid and for conveying away any superfluous tar or liquor that may collect. The ascension-pipe is also furnished with a pipe for the introduction of steam when requisite.

APPLICATIONS FOR LETTERS PATENT.

2948.—ALFRED TYLOR, of 2, Newgate Street, in the City of London, brass-founder, for "*Improvements in lavatories, the basins, cocks, taps, valves, and apparatus and arrangements connected therewith, parts of which improvements are applicable for other purposes for controlling and regulating the discharge of liquids and fluids, and preventing waste.*" Nov. 3, 1871.

2964.—THOMAS LEONARD BARBER EDGCOME, of 24, Brunswick Square, in the co. of Middlesex, gentleman, for "*Improvements in what are known as 'dry-earth closets and urinals.'*" Nov. 4, 1871.

2968.—JOHN SHANKS, of Barrhead, in the co. of Renfrew, N.B., sanitary engineer, for "*Improvements in and connected with water-closets.*" Nov. 4, 1871.

2975.—JOB COLE PROMENADE GARDEN, of Sutton Coldfield, in the co. of Warwick, and WILLIAM ABBOTT, of Birchfield, in the co. of Stafford, brassfounder, for "*Improvements in treating and utilizing sewage and other refuse matter, and in apparatus to be used for this purpose.*" Nov. 4, 1871.

2990.—GEORGE HENRY ELLIS, of 20, High Holborn, in the co. of Middlesex, engineer, for "*A new mode of treating the surfaces of asphalte roads and pavements for the purpose of preventing slipping.*" Nov. 7, 1871.

2992.—JOHN MACINTOSH, of North Bank, Regent's Park, in the co. of Middlesex, civil engineer, for "*Improvements in waterproof compounds for covering roadways, footpaths, floors, or other surfaces.*" Nov. 7, 1871.

2997.—HUGH SMITH, of 21, Westbourne Terrace Road, in the co. of Middlesex, for "*Improvements in the treatment of sewage to separate impurities therefrom.*" Nov. 7, 1871.

3015.—JOSEPH ELLICOTT HOLMES, of Buckingham Street, Strand, in the co. of Middlesex, civil and mechanical engineer, for "*An improved compound and apparatus employed in the manufacture of the same, chiefly designed for paving streets.*" Nov. 8, 1871.

3019.—EDWARD BARNES, of High Holborn, in the co. of Middlesex, engineer, for "*Improvements in gas-furnaces.*" Nov. 9, 1871.

3023.—PETER GENT, of New Brighton, in the co. of Chester, for "*An improved portable gas-oven for culinery purposes.*" Nov. 9, 1871.

3042.—PASCAL ALPHONSE MICCIO, of 29, Rue de Londres, Paris, merchant, for "*An improved paper book for giving publicity in and for deodorizing water-closets and other places.*" Nov. 10, 1871.

3045.—BRISTOW HUNT, of 1, Serle Street, Lincoln's Inn, in the co. of Middlesex, gentleman, for "*Improvements in water-meters.*" A communication. Nov. 10, 1871.

3070.—ALEXANDER M'CALLUM GORDON, of Liverpool, in the co. of Lancaster, soft metal pipe manufacturer, for "*Improvements in the manufacture of soft metal pipes, and in apparatus or appliances employed therein.*" Nov. 14, 1871.

3081.—JOHN CLARKSON, of Glasgow, in the co. of Lanark, N.B., engineer, for "*Improvements in steam pumps and engines.*" Nov. 15, 1871.

3085.—HENRY AUGUSTUS TILDEN, of New Lebanon, in the state of New York, U.S.A., for "*An improved compound for disinfecting and deodorizing.*" Nov. 15, 1871.

3090.—SAMUEL SMITH, of Aston, near Birmingham, in the co. of Warwick, gentleman, for "*Improvements in sliding gas-chandeliers or gaseliers, and other sliding gas-lamps.*" Nov. 15, 1871.

3094.—GEORGE SPENCER, of 77, Cannon Street, London, civil engineer, for "*Improvements in asphalte paving.*" Nov. 16, 1871.

3095.—ASTLEY PASTON PRICE, of 47, Lincoln's Inn Fields, in the co. of Middlesex, consulting chemist, for "*Improvements in the preparation of materials to be employed for paving or for other similar purposes.*" A communication. Nov. 16, 1871.

GRANTS OF PROVISIONAL PROTECTION.

2243.—HENRY YOUNG DARRACOTT SCOTT, of Ealing, in the co. of Middlesex, major-general, C.B., for "*Improvements in the treatment of sewage for the purpose of obtaining therefrom useful products, such as manure and cement.*" Aug. 26, 1871.

2401.—WILLIAM HENRY BARLOW, of 2, Old Palace Yard, in the city of Westminster, for "*Improvements in pumps, water-meters, and engines for obtaining motive power.*" Sept. 12, 1871.

2469.—CHARLES PINN, of Friars Green, in the parish of Holy Trinity, and of Queen Street, in the parish of St. David, in the city of Exeter, for "*An improved apparatus for preventing waste water in dwelling-houses and other buildings where water is supplied by pipes.*" Sept. 19, 1871.

2497.—JOHN WILLIAMSON, of 25, Warren Street, Stockport, in the co. of Chester, and WILLIAM GLAZIER, of 285, Duke Street, Rochdale, in the co. of Lancaster, for "*Improvements in dry closets or privies and commodes, and in apparatus to be used therewith.*" Sept. 22, 1871.

2567.—CHARLES DE CHASTELAIN, of Caprera Lodge, Wandsworth, in the co. of Surrey, gentleman, for "*Improvements in the mode of and apparatus for intercepting, collecting, and filtering fœcal and sewage or drainage matters.*" Sept. 29, 1871.

2578.—MATHEW WILSON, of Hills Place, Oxford Street, in the co. of Middlesex, for "*Improvements in stench-traps.*" Sept. 29, 1871.

2609.—THOMAS BALL, of Nottingham, gentleman, for "*Improvements in the treatment of ammoniacal liquor and lime resulting from the manufacture and purification of gas in gas-works.*" Oct. 3, 1871.

2714.—LOUIS STERNE, of 9, Victoria Chambers, in the city of Westminster, engineer, for "*Improvements in meters for water, gas, and other fluids.*" A communication. Oct. 13, 1871.

2755.—ALEXANDER MANN, of 107, Holley Street, Dalston, in the co. of Middlesex, for "*Improvements in taps or valves.*" Oct. 17, 1871.

2761.—JAMES WELSH, DAVID HOPE, and JAMES CAMBELL STEVENSON, of Liverpool and Southport, in the co. of Lancaster, for "*Improved means and apparatus to be used in purifying atmospheric air previous to admission into dwelling-houses, public and other buildings, in the ventilation of such buildings, and regulation of the temperature thereof.*" Oct. 17, 1871.

2763.—WILLIAM CROOKES, of the City of London, scientific chemist, for "*An improved disinfectant and deodorizer.*" Oct. 18, 1871.

2764.—WILLIAM WRIGHT, of Sheffield, in the co. of York, plumber, for "*Improvements in apparatus for flushing water-closets and other purposes.*" Oct. 18, 1871.

2767.—JACOB HOLDSWORTH, of Bradford, in the co. of York, manufacturer, for "*An improved feed or supply pipe for supplying illuminating gas to gas-burners.*" Oct. 18, 1871.

2815.—EDWARD THOMAS HUGHES, of the firm of Hughes and Son, 123, Chancery Lane, London, patent agents, for "*An improved liquid-meter.*" A communication. Oct. 21, 1871.

2908.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in paving and asphalting roads, streets, and footways, and in the composition employed therefor.*" A communication. Oct. 31, 1871.

2926.—ADOLPHE PIERRE VASSARD, of New Cross, in the co. of Kent, chemist, for "*Improvements in treating liquid sewage and other ammoniacal liquors.*" Nov. 1, 1871.

2937.—ALFRED VINCENT NEWTON, of 66, Chancery Lane, in the co. of Middlesex, mechanical draughtsman, for "*An improved construction of engine for raising water.*" A communication. Nov. 1, 1871.

2948.—ALFRED TYLOR, of 2, Newgate Street, in the City of London, brass-founder, for "*Improvements in lavatories, the basins, cocks, taps, valves, and apparatus and arrangements connected therewith, parts of which improvements are applicable for other purposes for controlling and regulating the discharge of liquids and fluids, and preventing waste.*" Nov. 3, 1871.

2964.—THOMAS LEONARD BARBER EDGCOME, of 24, Brunswick Square, in the co. of Middlesex, gentleman, for "*Improvements in what are known as 'dry-earth closets and urinals.'*" Nov. 4, 1871.

2968.—JOHN SHANKS, of Barrhead, in the co. of Renfrew, N.B., sanitary engineer, for "*Improvements in and connected with water-closets.*" Nov. 4, 1871.

2975.—JOB COLE PROMENADE GARDEN, of Sutton Coldfield, in the co. of Warwick, and WILLIAM ABBOTT, of Birchfield, in the co. of Stafford, brassfounder, for "*Improvements in treating and utilizing sewage and other refuse matter, and in apparatus to be used for this purpose.*" Nov. 4, 1871.

2990.—GEORGE HENRY ELLIS, of 20, High Holborn, in the co. of Middlesex, engineer, for "*A new mode of treating the surfaces of asphalte roads and pavements for the purpose of preventing slipping.*" Nov. 7, 1871.

NOTICES TO PROCEED.

1716.—PHILIP JOHN DAVIES, of 7, Campsbourne Terrace, Hornsey, in the co. of Middlesex, hydraulic engineer, for "*An improved apparatus for the prevention of damage caused by the bursting of water-pipes in times of frost or otherwise, and for the prevention of water waste generally.*" July 3, 1871.

1749.—MATTHEW WILSON, of Hill's Place, Oxford Street, in the co. of Middlesex, wine merchant, for "*Improvements in sink-traps.*" July 5, 1871.

2243.—HENRY YOUNG DARRACOTT SCOTT, of Ealing, in the co. of Middlesex, major-general, C.B., for "*Improvements in the treatment of sewage for the purpose of obtaining therefrom useful products, such as manure and cements.*" Aug. 26, 1871.

2407.—ANDRÉ BRESSON, of 5, Falcon Street, London, engineer, for "*An improved vehicle or moveable machine for transporting and maintaining bituminous matters long distances in a sufficient state of fusion for paving, unaccompanied by fire.*" Sept. 12, 1871.

2462.—WILLIAM PAWSON, of Westgate, Grantham, in the co. of Lincoln, plumber, for "*Improvements in taps or valves for hot and cold water apparatus.*" Sept. 19, 1871.

2541.—ANDRÉ BRESSON, of 7, Falcon Street, London, engineer, for "*An improved system of manufacturing asphalte, and improved apparatus for effecting the same.*" Sept. 27, 1871.

2586.—JOSEPH ROGERS, of St. John's Street Road, and GUSTAVE DE MEIRELLES SOARES, of York Buildings, Adelphi, both in the co. of Middlesex, for "*Improvements in the manufacture of bituminous asphalte paving or covering for roads and other ways, and in the means of strengthening the surfaces of the same to facilitate traffic thereon.*" Sept. 30, 1871.

2613.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in water-meters.*" A communication. Oct. 3, 1871.

2714.—LOUIS STERNE, of 9, Victoria Chambers, in the city of Westminster, engineer, for "*Improvements in meters for water, gas, and other fluids.*" A communication. Oct. 13, 1871.

2738.—STEPHEN HENRY EMMENS, of 2, Gresham Buildings, Basinghall Street, in the City of London, scientific referee, for "*Improvements in the construction of asphalte roads.*" Oct. 16, 1871.

2844.—WILLIAM THOMAS SUGG, of Vincent Works, Vincent Street, in the city of Westminster, for "*Improvements in apparatus for distributing fluids and liquids.*" Oct. 24, 1871.

2879.—ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the co. of Middlesex, patent agent, for "*An improved process for the treatment of night-soil and town or domestic refuse matters for the manufacture of manure, to be called 'taffo-guano.'*" A communication. Oct. 26, 1871.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

3214.—JOSEPH WESTWOOD, jun., "*Improvements in the construction of socket-joints for metal pipes and columns.*" Oct. 20, 1868.

3230.—MARC ANTOINE FRANÇOIS MENNONS, "*An improved engine for raising and forcing water.*" Oct. 22, 1868.

3260.—HENRY EDWARD NEWTON, "*Improvements in steam-pumps.*" Oct. 24 1868.

3273.—WILLIAM EDWARD GEDGE, "*An improved gas-burner.*" Oct. 26, 1868.

3314.—HENRY WALLWORK, "*Improvements in taps or valves.*" Oct. 29, 1868.

3324.—JULIUS BRÖNNER, "*An improved construction and application of shades to gas-lights.*" Oct. 31, 1868.

3392.—WILLIAM CORDEN, "*Improvements in lamp globes or glasses.*" Nov. 7, 1868.

PATENT WHICH HAS BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

2735.—HENRY ANDERSON GWYNNE, "*Improvements in the manufacture and construction of centrifugal pumps and parts connected therewith, parts of which improvements are applicable to other machinery.*" Nov. 4, 1864.

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1 in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lb.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle and Middlesboro'.	Wales.	Yorkshire, Derbyshire, and Staffordshire
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Pig Iron, No. 1 (g.m.b.)	4 10 0	3 10 6	3 15 0	4 0 0	4 0 0
1¼ and 2-inch Socket-pipes	7 12 6	6 12 6	6 10 0	6 17 6	7 2 6
2½ and 3-inch ditto	6 17 6	5 17 6	5 10 0	5 17 6	6 2 6
4 and 5-inch ditto	6 12 6	5 12 6	5 7 6	5 15 0	6 0 0
6 inches and upwards ditto	6 7 6	5 7 6	5 2 6	5 10 0	5 17 6
Retorts, 1st fusion, hot blast	6 2 6	5 2 6	4 17 6	5 12 6	6 2 6
Ditto, 2nd ditto, cold ditto	7 2 6	6 2 6	5 17 6	6 12 6	7 2 6
Tank-plates, ¼ thick and above	6 12 6	5 12 6	5 7 6	6 2 6	6 12 6

WROUGHT-IRON TUBING,

Subject to 60 per cent. Discount.

	2 in.	1¼ in.	1½ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 14 feet— per foot	1 9	1 2	0 11	0 8	0 6	0 4½
Ditto ditto, from 12 in. to 23½ in.—each	3 0	2 0	1 8	1 4	1 0	0 9
Long Screws, from 12 in. upwards	4 0	2 6	2 0	1 6	1 2	0 11
Bends and Springs	4 3	2 3	1 9	1 3	0 11	0 8
Square Elbows, equal or reducing; Round Elbows, 5 per cent. extra	3 6	2 3	1 9	1 2	0 10	0 8
Tees, wrought or cast	3 9	2 6	1 9	1 3	1 0	0 9
Crosses, ditto, equal or reducing	5 3	3 6	3 0	2 3	1 9	1 5
Iron Cocks	18 0	11 0	8 6	6 6	4 6	3 6
Ditto, with brass plug	32 0	19 6	15 0	10 6	7 6	5 6
Diminishing Sockets, Caps, Plugs, and Nipples	1 3	0 11	0 9	0 7	0 6	0 5
Plain Sockets	1 0	0 7	0 6	0 4	0 3½	0 3
Syphons, 2-quart	23 0	19 0	18 0	17 0	16 0	—

FREIGHTS.

Coastwise—Newcastle:—	Per Ton.	*Foreign.—*	Per Keel.
Chatham and Rochester	6s. 9d	Barcelona	£20 15s
Cork	8 6	Bordeaux	10 10
Dover, Folkestone, & Ramsgate	7 3	Boulogne and Calais	8 13
Dublin	9 0	Cadiz	13 10
Exeter Quay	9 0	Cronstadt	10 10
Ipswich	6 6	Copenhagen	10 0
London (from Leith)	—	Genoa	18 0
London (Pool)	7 0	Hamburg	10 16
Lowestoft and Yarmouth	6 9	Havre de Grace	10 6
Portsmouth & Southampton	9 0	Leghorn	18 10
Plymouth	9 6	Lisbon	10 10
Shoreham	8 0	Rotterdam	11 10
Whitstable	7 6	Stettin	13 6
Weymouth	8 6	Trieste	18 10
		Venice	20 0

SUNDRIES.

Best Newcastle Fire-bricks, per 1000	£2 10s. to £2 15s. 0d.
Cliff's Fire-bricks (at Wortley), per 1000	3 15 0
Ingham's ditto (at Wortley), per 1000	3 15 0
Farnley Iron Co.'s Fire-bricks (at Wortley), less discount	3 17 0
Fire-clay Retorts, per foot run	0s. 6d. to 0 7 6
Tarred Rope Yarn, per cwt.	1 0 0

WEEKLY METAL REPORT.

(*From* J. Berger Spence & Co.'s *Circular.*)

Chemicals.—The trade in chemicals for this season of the year is in a very satisfactory condition. For home consumption orders are given out in plenty, but the foreign demand has sensibly declined; the market, therefore, is necessarily quieter for present delivery. Manufacturers, hopeful, do not, as a rule, lower quotations. Liverpool exports of chemicals have diminished. America requires less than usual. Caustic soda and soda ash are in pretty uniform request and value. Soda crystals in fair demand. The unusual requirements for export have rapidly run up the price of sulphate of copper, and makers seem disinclined to book any orders under £27. The revival of nitrate of soda has about it symptoms of a relapse to 16s. Prussiates are still scarce, with a tendency to rise. Benzole rather animated. Bichrome held at 10d. Alum in great and uniform demand. Bleaching-powder dull at £13; sales made for all 1872 at 11s. 3d. Sulphate of ammonia still keeps high, although shipments for the Continent have almost ceased. Muriate of potash looking upwards.

GAS COALS.

Newcastle—Unscreened:—	Per Ton 6s. 6d.
Haswells, Nettlesworth Primrose, and South Pelaw	
Felling, Framwell Gate, North Pelton, Redheugh Main, Walker's Primrose, West Wear, and Whitwell Primrose	7 6
Burnhope, Craghead, Charlaw, Derwent, East Castle, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Ravensworth, Seaham, South Moor Pelton, South Leverson, Townley Main, Tyne Main, West Pelaw, Wearmouth Hutton, and Witton	7 0
Pearth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	7 3
Brancepeth, Dean's Primrose, Londonderry Gas, New Pelton, Pelton, South Pearth, Stella, Urpeth, Washington Hutton, and West Leverson	7 6
Ramsay's Newcastle Cannel	17 6
Wigan Cannel (at Liverpool)	17 0

Scotch Cannel, f.o.b.:—	Per Ton.	*Scotch Cannel*, f.o.b.:—	Per Ton.
Boghead—at Bo'ness, 47s. 6d.; at Leith	48s. 2d	Arniston (at Leith)	21s. 0d
Muirairk	27 0	Wemyss (at Wemyss)	20 0
Kirkness, best (at Burntisland)	22 6	Haywood Co.'s Haywood (at Granton)	21 6
Capeldrae, 1st quality (at ditto)	22 6	Pirnie, or Methill	17 0
Ditto, 2nd ditto (at ditto)	17 6	Lothian's Cannel (at Leith)	24 6
Cowdenbeath (at ditto)	12 0	Grange ditto (at Bridgeness)	17 6
Lochgelly (at ditto)	12 0	Kinniel ditto (at Bo'ness)	17 6
Donnibristle—at Burntisland, 12s.; at Aberdour	12 6	Myles' ditto	23 6
Auchinheath Lesmahago (at Granton)	37 0	Lochore Parrot (at Burntisland)	25 0
Duke of Hamilton's Lesmahago (at Granton)	27 0	Waverley Seam (at do.)	16 0
		Lanemark (at Glasgow)	16 0
		Elphinstone Tower (at Leith)	20 0

TURNER & ALLEN,

201, UPPER THAMES STREET,

London,

GAS & WATER ENGINEERS.

CONTRACTORS FOR THE SUPPLY OF

LAMP COLUMNS, LANTERNS, FOUNTAINS, PIPES, &c.,

TO

GAS, WATER, & RAILWAY COMPANIES, LOCAL BOARDS, SHIPPERS, &c.

Complete Pattern and Price Book, 3s. 6d. post free.

DUKE OF HAMILTON'S
LESMAHAGOW GAS COAL.

LESSEES:

LESMAHAGOW AND LONGLEE COAL COMPANY,

Office—5, DIXON STREET, GLASGOW.

Works—BLACKWOOD & SOUTHFIELD, LESMAHAGOW.

English and Foreign Agents:

JAMES MILLER, SON, & Co.,

1, GREAT ST. HELEN'S. LONDON, E.C.,

AND

75, UNION STREET, GLASGOW.

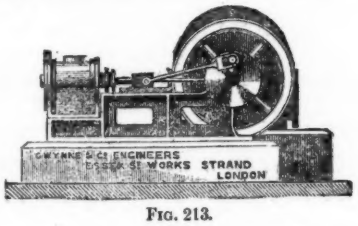

Fig. 213.

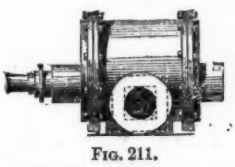

Fig. 211.

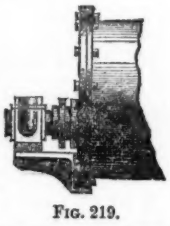

Fig. 219.

GWYNNE & COMPANY,

HYDRAULIC, MECHANICAL, AND GAS ENGINEERS,

ESSEX STREET WORKS, STRAND,

London, W.C.,

SOLE MANUFACTURERS OF

BEALE'S IMPROVED PATENT GAS-EXHAUSTER,

Under the personal superintendence of Mr. BEALE.

REDUCED PRICES AND INCREASED CAPACITY.

Also manufacturers of Improved Hydraulic Regulators, to actuate a steam or gas throttle-valve to suit the make of gas; self-acting bye-pass valves, to move by hand or otherwise; improved stop-valves, with faced flanges, forming the neat adjunct to Exhauster of valve and elbow combined. Two of the largest Gas-Exhausters belonging to London Companies are now altered to our new principle, and are working most successfully.

The Gas-Exhausters may be made with inside or outside bearing, as shown in Figs. 211 and 219.

Fig. 213 shows the Improved Gas-Exhauster attached to, and driven by one of Gwynne and Co.'s well-known high-speed Horizontal Steam-Engines, without any intermediate gearing. This arrangement is extremely compact, and is beautifully adapted for small or large Gas-Works, and the foundations and erection are both very simple and inexpensive.

Prices and every information upon application to Gwynne and Co. *as above.*

DUKE OF HAMILTON'S
LESMAHAGOW GAS COAL.

The superior quality of this well-known Cannel, as wrought by

THE NITSHILL AND LESMAHAGOW COAL COMPANY,

Is now generally admitted by all Gas Engineers.

PRICE AND ANALYSIS MAY BE HAD ON APPLICATION TO

JAMES M'KELVIE, HAYMARKET, EDINBURGH.

C. & W. WALKER

CONSTRUCT THE LARGEST SIZED

GASHOLDERS, TELESCOPE AND SINGLE-LIFT,

Midland Iron-Works, Donnington, near Newport, Shropshire; 8, Finsbury Circus, London.

WANTED, by a Gentleman, a situation as ASSISTANT to a Gas Manager or Engineer. Has had several years experience in one of the largest Gas-Works in London. Good chemist and draughtsman, &c.
Address R. M., Post-Office, Wanstead, ESSEX.

WANTED, a situation as Main and SERVICE LAYER, by one who has had sixteen years experience in erecting small Gas-Works. Can do gas-fitting if required.
Address G. G., Post-Office, Retford, NOTTS.

WANTED, Six Copies of "Gas Manipulation," by WILLIAM SUGG, Edition 1867. Seventeen Shillings per copy will be given for clean copies.
Address WILLIAM SUGG, Vincent Works, Vincent Street, WESTMINSTER, S.W.

WANTED, by the Advertiser, a situation as FOREMAN or WORKING FOREMAN of Gas-Fitters, &c., either in or out of England. Good reference can be given.
Address G., 13, Railway Street, Newport, MON.

WANTED, an experienced Gas-Fitter, for a port in the Brazils. Must be thoroughly conversant with his duties, and willing either to work or superintend. A good knowledge of brass-finishing requisite, and preference would be given to a married man.
Address, with testimonials, stating age, salary required, and full particulars, to S. B, 3, Victoria Street, WESTMINSTER, S.W.

WANTED, by a good steady workman, a situation as GAS-FITTER. First-class testimonials can be given as to character, &c.
Address, stating wages given, to W. CARTWRIGHT, care of Mr. Ardern, George Street, Altrincham, CHESHIRE.

TO GAS COMPANIES.

WANTED, by an experienced Man, aged 32, an engagement as MANAGER in a small works, or UNDER-MANAGER in a large works.
Apply to A. B. C., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a situation as Working FOREMAN or MANAGER of Gas-Works; 20 years experience. Good draughtsman. First-class testimonials.
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WANTED, by a young Man, an engagement as GENERAL MANAGER. Is thoroughly conversant with the manufacture of gas and the whole routine of a Gas-Work, the keeping of accounts, and carrying out of extensions and alterations. Good testimonials.
Address W. C., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a set of two Purifiers, with centre-valve and 4-in. or 5-in. pipes, about 4 or 5 ft. square. Must be in good condition, and all fittings complete.
Apply to JOHN DUNNING, Estate Office, MIDDLESBOROUGH.

STALYBRIDGE GAS COMPANY.

WANTED, by the above Company, a thoroughly experienced GAS ENGINEER and MANAGER, to take the entire charge of their works, at which the present annual make of gas is about 120,000,000 cubic feet.
Application, with testimonials, stating age and amount of salary required, to be addressed, not later than Dec. 1, to GEORGE TAYLOR, Esq., Clerk to the Company, STALYBRIDGE.

WORKING MANAGER Wanted, by the Barnet Consumers Gas Company, Limited. The duties to comprise taking the indices of the consumers meters and collecting the accounts, laying services and fixing meters, and the general superintendence of the works.
None need apply but those who are competent, and of unexceptionable character. Salary £80 per annum, with a cottage on the works, and the use of coal and gas.
Applications to be made to Mr. E. S. CATHELS, Aberdalgie Lodge, Lower Sydenham, KENT, S.E.

TO GAS COMPANIES AND OTHERS.

THE Advertiser is open for an engagement as MANAGER. For the past six years has had the management of a work where the make is over 30 millions annually. The highest testimonials given.
Apply to A. D., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS COMPANIES AND OTHERS.

THE Advertiser is open for an Engagement. Is 22 years of age, and has been employed as Meter Surveyor, Bookkeeper, and General Assistant to his father for upwards of ten years, writes a good hand, and is willing to make himself generally useful in any large Gas-Works where he can get more knowledge of the business. He also is thoroughly conversant with the superintendence of laying gas-mains, services, public and private lighting, fitting meters, both wet and dry, besides the general management of Gas-Works throughout.
Apply to J. B., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS COMPANIES AND OTHERS.

ON SALE, at the Gas-Works, Cheltenham, Two STATION-METERS, in good working order. One 30,000 cubic feet per hour by Laidlaw, and one 12,000 cubic feet per hour by Wright, both with inlet and outlet connexions and valves complete.
Two BEALES EXHAUSTERS, 50,000 and 20,000 cubic feet per hour respectively.
Also a 60 ft. by 30 ft. TELESCOPE GASHOLDER, with columns, girders, and counterbalance.
Particulars may be obtained on application to R. O. PATERSON, Engineer.
Gas-Works, Cheltenham, Oct. 21, 1871.

GAS TAR.

THE Hay Gas Company have about 10,000 gallons of GAS TAR FOR SALE, at One Penny per gallon, at the works.
Hay, Nov. 7, 1871. CHAS. GRIFFITHS, Sec.

A SAD STORY.

THE following Subscriptions have been received on behalf of the family of the late Mr. RICHARDS:—

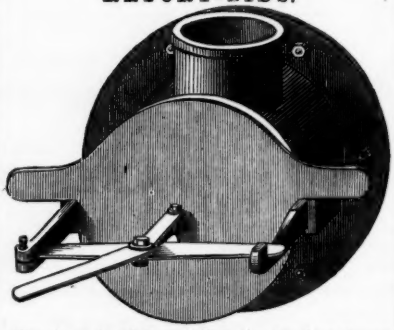
Sums already acknowledged	£157	3	6
J. R. Macfarlane	1	0	0
— Allcock	0	5	0
Robinson Brothers, Coventry . . .	2	2	0
F. W. Hartley, London	1	1	0

TO COKE CONTRACTORS AND OTHERS.

THE Directors of The Gaslight and Coke Company are prepared to receive TENDERS for the purchase, during a term of One or more years, commencing on the 1st of January next, of the whole or any part of the COKE which will be manufactured at their works at Beckton, on the River Thames, near Barking Creek.
Tenders should state the price per chaldron delivered free on board barges alongside the Company's wharf at Beckton, and into trucks on the Company's line of railway which will communicate with the Great Eastern Railway near North Woolwich. Contractors may be required to enter into a bond, with sureties, for the due performance of their contract. Payments monthly in cash.
Further information, if desired, may be obtained at this Office, on application to the undersigned, to whom sealed tenders, marked "Tender for Coke," should be sent on or before Thursday, the 30th inst.—By order,
JOHN ORWELL PHILLIPS, Secretary.
N.B.—The Directors do not bind themselves to accept the highest or any tenders, and reserve to themselves the right of accepting the whole or any portion of one tender.
Horseferry Road, Westminster, Nov. 14, 1871.

MR. J. T. B. PORTER and Mr. ARTHUR SILVERTHORNE advise Corporations, Gas Companies, and others, on all matters relating to Gas Manufacture, Water-Works, Drainage, &c.
1, Westminster Chambers, Victoria Street, London, S.W.

BOX'S PATENT FASTENING FOR RETORT-LIDS.



The above description of Fastening has been in successful use for a considerable time, and can be supplied at a much more economical rate than the ordinary cross-bar and screw.
For prices and particulars, apply to W. Box, Gas-Works, Crayford, KENT.

CLOTH GAS-BAGS for MAINS, as supplied to the Imperial, Chartered, and other London and Provincial Gas Companies. Bellows and Valves for inflating Well Dresses, Stokers Gloves, India-Rubber Suction and Delivery Hose, Gas-Tubing, Leather, India-Rubber and Gutta-Percha Machine-Bands, Sheet and Washers for Steam Joints.
T. BUDDEN, Manufacturer, 79, Goswell Road, LONDON, E.C.

EDGE'S PATENT
FOR REMOVING THE
CARBONACEOUS INCRUSTATION FROM GAS-RETORTS.

"*Gas-Works, Bury St. Edmund's, Oct.* 24, 1870.
"Dear Sir,—In answer to your inquiry about Edge's patent method of scurfing Retorts, I beg to inform you that I can give it my unqualified recommendation.
"Some years ago, in order to facilitate the scurfing process, I introduced open-ended Retorts here, and found them a great improvement upon the common Retorts, which, in addition to the damage they received at scurfing times, were very leaky for several days afterwards. Even with that plan there was a considerable amount of labour and care, which I have avoided since the adoption of Edge's method.
"I find the amount paid for royalty less than the entire cost of open-ended Retorts; and in addition, that less labour is required and less damage is done to the Retort in scurfing.
"As Edge's method does not burn the carbon out of the cracks so much as most other plans, and my stokers are pleased with it, I regard it as invaluable in reducing one of the anxieties of the gas manufacturer.
"Having a steam-engine on the premises, it was easy of adoption here, but my opinion of it is so high that I would recommend all gas managers who are not so situated, to provide themselves with a portable steam-boiler, and am sure that they will never regret the investment.—I am, dear sir, yours truly,
"E. Goddard, Esq." "THOS. H. METHVEN.
For particulars and terms, apply to E. GODDARD, Sole Agent, Gas-Works, IPSWICH.

STATION-METER FOR SALE, to pass 30,000 feet per hour. Is of the best description, and nearly as good as new.
Apply at the Brighton and Hove General Gas Company's Works, Hove, near BRIGHTON.

BUENOS AYRES GAS COMPANY.

THE Undersigned Agent for the above Company will receive TENDERS for the supply of 12,000 tons CANNEL, to be delivered free on board at Liverpool, during next year, at the rate of about 1000 tons per month. The Cannel must be smooth and hard, produce about 10,000 feet of 25-candle gas, good coke, and be in pieces no smaller than about the size of an ordinary brick. If it can be delivered cheaper elsewhere than at Liverpool, the price at the cheapest port to be also stated.
Tenders will be received up to the 30th of November, and the undersigned does not bind himself to accept the cheapest or any tender. LOUIS WILDE.
4, Cable Street, Liverpool, Oct. 26, 1871.

GLASGOW CORPORATION GAS.

TENDER FOR TAR AND AMMONIACAL LIQUOR.

THE Gas Committee of the Corporation of Glasgow are prepared to receive TENDERS for the PURCHASE of the TAR and AMMONIACAL LIQUOR produced at the Townhead and Partick Gas-Works, also at the new works about to be erected at Maryhill. The contract to be for ten years, from the 31st of May, 1872.
The Corporation will erect the necessary building and apparatus for the utilization of the tar and liquor on ground acquired for that purpose adjoining the new Maryhill Works, for which the contractor will pay a yearly rent during the currency of the contract.
Forms of tender, on which offers must be made, may be obtained at the Manager's Office, 42, Virginia Street, Glasgow, on and after the 10th of November, and must be returned, addressed to the "Committee on Gas Supply," to the Gas Office, 42, Virginia Street, Glasgow, not later than the 15th of December, 1871.
The Committee do not bind themselves to accept the highest or any tender.
42, Virginia Street, Glasgow, Nov. 2, 1871.

PRIVATE TELEGRAPHS FOR GAS AND WATER WORKS.

THE Electric Telegraph Department of our business is most efficiently conducted by an experienced staff. CONTRACTS entered into for maintenance and erection of lines for Gas and Water Companies, private residences, hotels, &c. Bailey's simple A B C instrument is stronger and less liable to derangement than any other in the market. Price £6 per pair. Makers of maximum and minimum Electrical Indicators and Signals for Reservoirs. Water Pressure Recorders. Managers of Gas and Water Works are invited to ask us for our quotations, or for any information connected with Telegraphy.
Just published, 800 engravings, 4to., post free 2s. in stamps, weight 10 oz., cost of production £1000,

BAILEY'S Illustrated Inventions, containing details and prices of goods in our five several departments:—(1) Brass Foundry, Steam Gauges, Indicators, Feeders, and Fittings; (2) Engineers Sundries, Small Tools, and Stores; (3) Machine Pump and Fire Engine; (4) Turret Clock, &c.; (5) Electric Telegraph, A B C Instruments, Bells, and Apparatus.
J. BAILEY and Co., Albion Works, Salford, Lancashire.

MODERN STREET LIGHTING, by WILLIAM SUGG, A.I.C.E., price 1s. 6d., is now ready, and will be forwarded post free for 19 stamps.
W. SUGG, Vincent Works, Vincent St., WESTMINSTER, S.W.

Now ready, price One Shilling,

THE WATER SUPPLY OF LONDON.
A speech delivered in the House of Commons, May 23, 1871; also a preface on the METROPOLIS WATER ACT. By U. J. KAY-SHUTTLEWORTH, M.P. To which is appended, by permission, a speech delivered in the same debate by Dr. LYON PLAYFAIR, C.B., M.P., F.R.S.
WILLIAM RIDGWAY, 169, PICCADILLY, W., and all booksellers.

JOURNAL OF GAS LIGHTING.—Subscribers who have SPARE COPIES of the following Numbers may obtain the FULL PUBLISHING PRICE of same on sending them to Mr. W. B. KING, 11, Bolt Court, Fleet Street, LONDON; they being required to complete sets.
Nos. 397, dated January 7, 1868.
„ 423, „ January 5, 1869.
„ 461, „ June 7, 1870.

Demy 16mo, Sixty-four pages,

ADVANTAGES of GAS. By J. O. N. RUTTER. A new edition.—198th Thousand.
Brighton: Published by the Author.
This little book is intended for distribution by Gas Companies and the manufacturers of gas apparatus. It has done good in making known the benefits and promoting the sale of gas; and it is hoped that its usefulness might be continued and greatly extended.
Prices:—1000 copies, £8; 500 copies, £4 5s.; 250 copies, £2 5s. Any smaller number at 20s. per 100 copies.
A specimen copy free per post for three penny stamps. Covers printed specially.
Apply to J. O. N. RUTTER, Black Rock, BRIGHTON.
Nov. 13, 1871.

COOKING AND HEATING BY GAS, by MAGNUS OHREN, A.I.C.E. Price 6d., by post 7d. Sent direct from the Author. Gas Companies can be supplied with copies at an agreed price, according to number, with name and particulars altered to suit their locality, to circulate amongst their consumers.
Address GAS-WORKS, Bell Green, Lower Sydenham, LONDON, S.E.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,
Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.
N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention. CHARLES HORSLEY, Agent.

GAS TAR AND AMMONIACAL LIQUOR FOR SALE.

THE Directors of the Hartlepool Gas and Water Company are prepared to receive TENDERS for the surplus TAR and AMMONIACAL LIQUOR to be produced at their works, West Hartlepool, for One, Two, or Three years, from the 1st of December next.

The quantity of Tar will be about 40,000 gallons, and Liquor about 45,000 gallons per annum, and will be delivered into contractor's tanks on the Railway Company's siding at the above works.

No person need tender who is not prepared to remove both the tar and liquor in "tank trucks," and no tender will be received after the 29th inst.

The Directors do not bind themselves to accept the highest or any tender.—By order,

THOMAS TREWHITT, Secretary.

West Hartlepool, Nov. 2, 1871.

FOR SALE.—Four Purifiers, 10 ft. square, with centre-valve and connexions. Two Purifiers, 12 ft. square. A Beale's Exhauster, to pass 35,000 feet per hour, with governor and bye-pass. A Jones's Exhauster, to pass about 15,000 feet per hour. A Station-Meter, to pass 25,000 feet per hour. Mouthpieces, Hydraulic Main, and other apparatus suitable for Gas-Works.

Apply to the Tynemouth Gas Company, NORTH SHIELDS.

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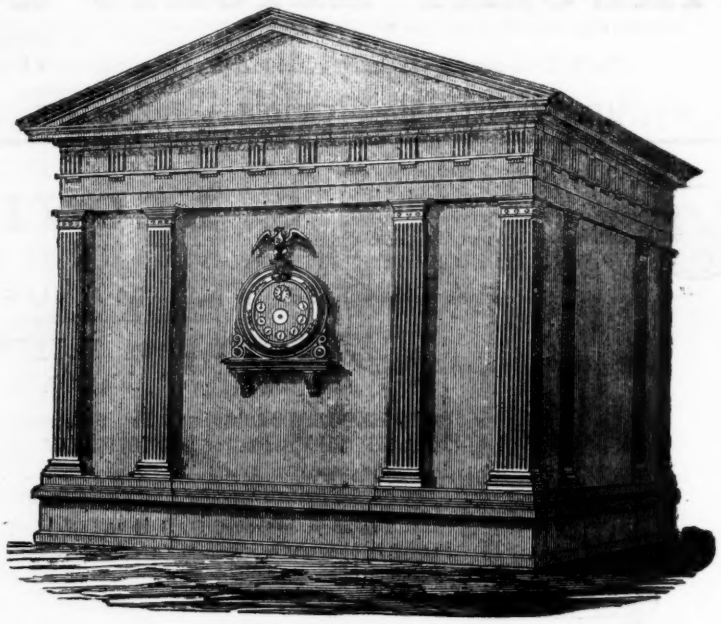

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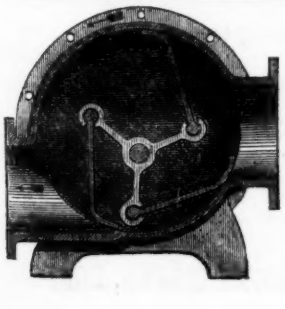

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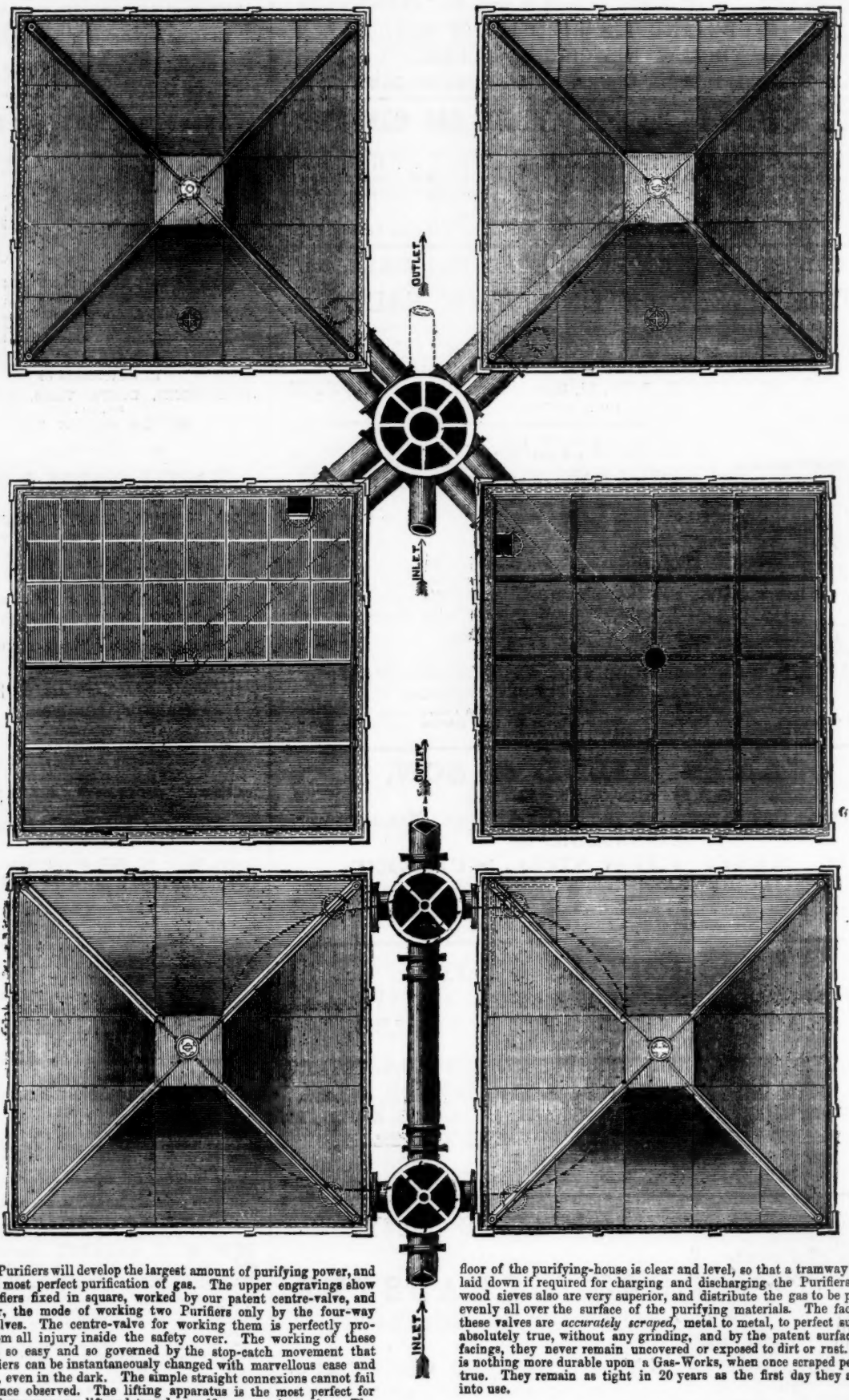

These Purifiers will develop the largest amount of purifying power, and effect the most perfect purification of gas. The upper engravings show four Purifiers fixed in square, worked by our patent centre-valve, and the lower, the mode of working two Purifiers only by the four-way centre-valves. The centre-valve for working them is perfectly protected from all injury inside the safety cover. The working of these valves is so easy and so governed by the stop-catch movement that the Purifiers can be instantaneously changed with marvellous ease and certainty, even in the dark. The simple straight connexions cannot fail to be at once observed. The lifting apparatus is the most perfect for work, and one man can lift and travel a purifier-cover of any size. The floor of the purifying-house is clear and level, so that a tramway can be laid down if required for charging and discharging the Purifiers. The wood sieves also are very superior, and distribute the gas to be purified evenly all over the surface of the purifying materials. The facings to these valves are *accurately scraped*, metal to metal, to perfect surfaces, absolutely true, without any grinding, and by the patent surfaced bar facings, they never remain uncovered or exposed to dirt or rust. There is nothing more durable upon a Gas-Works, when once scraped perfectly true. They remain as tight in 20 years as the first day they are put into use.

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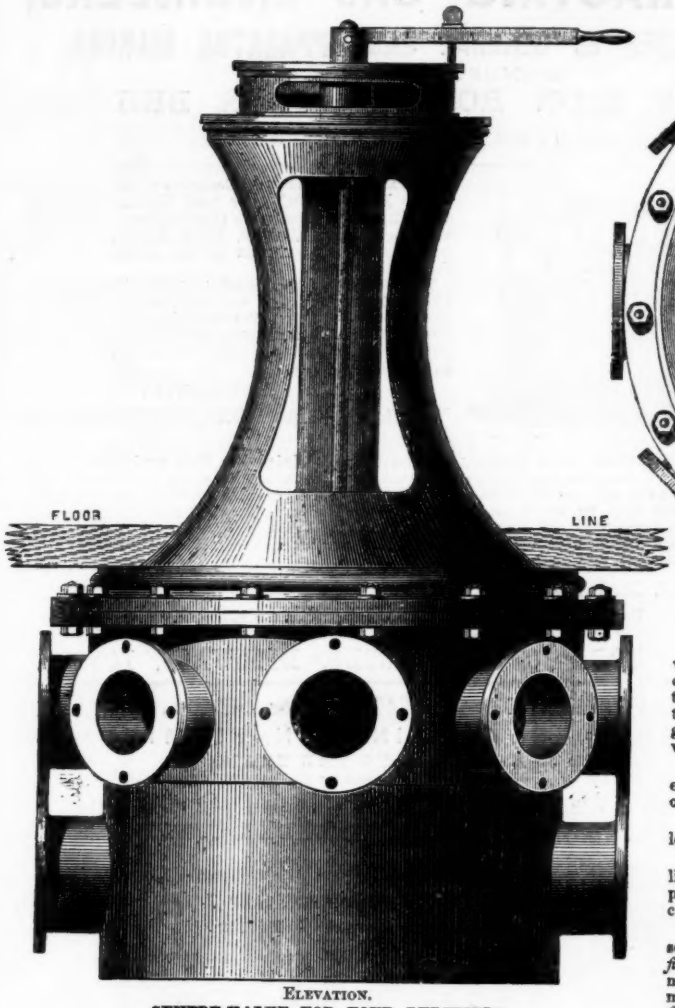

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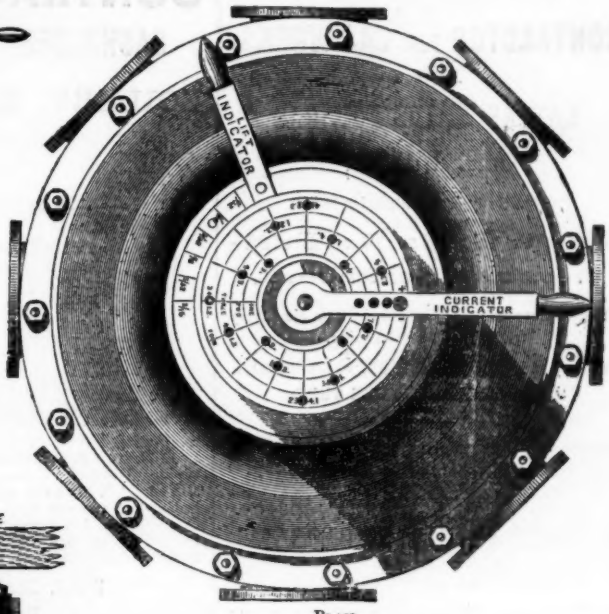

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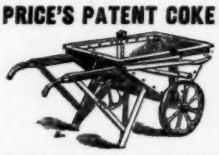

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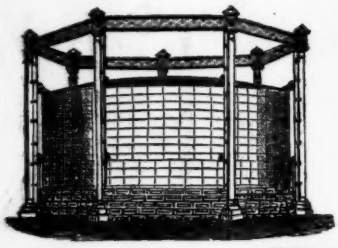

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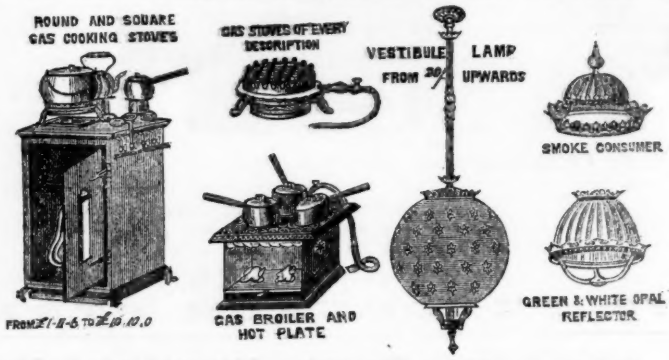
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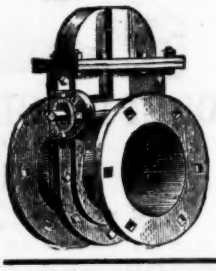

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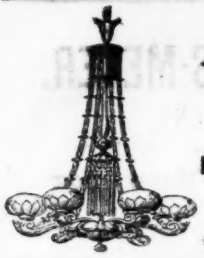

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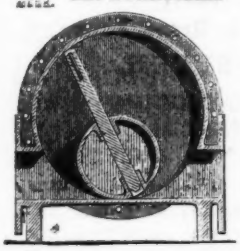

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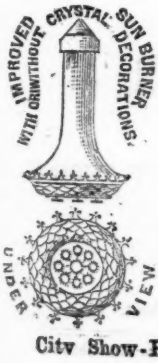

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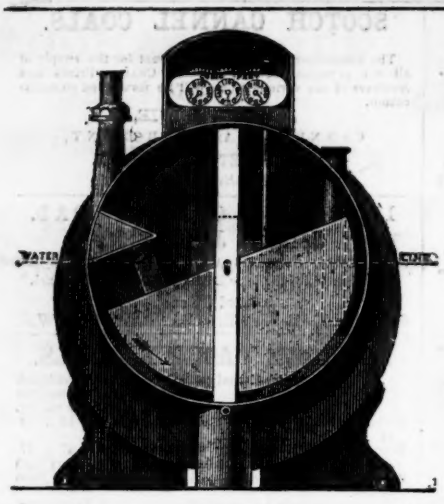

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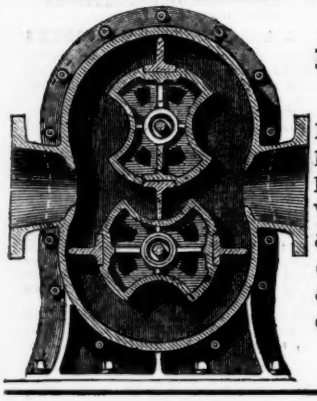

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